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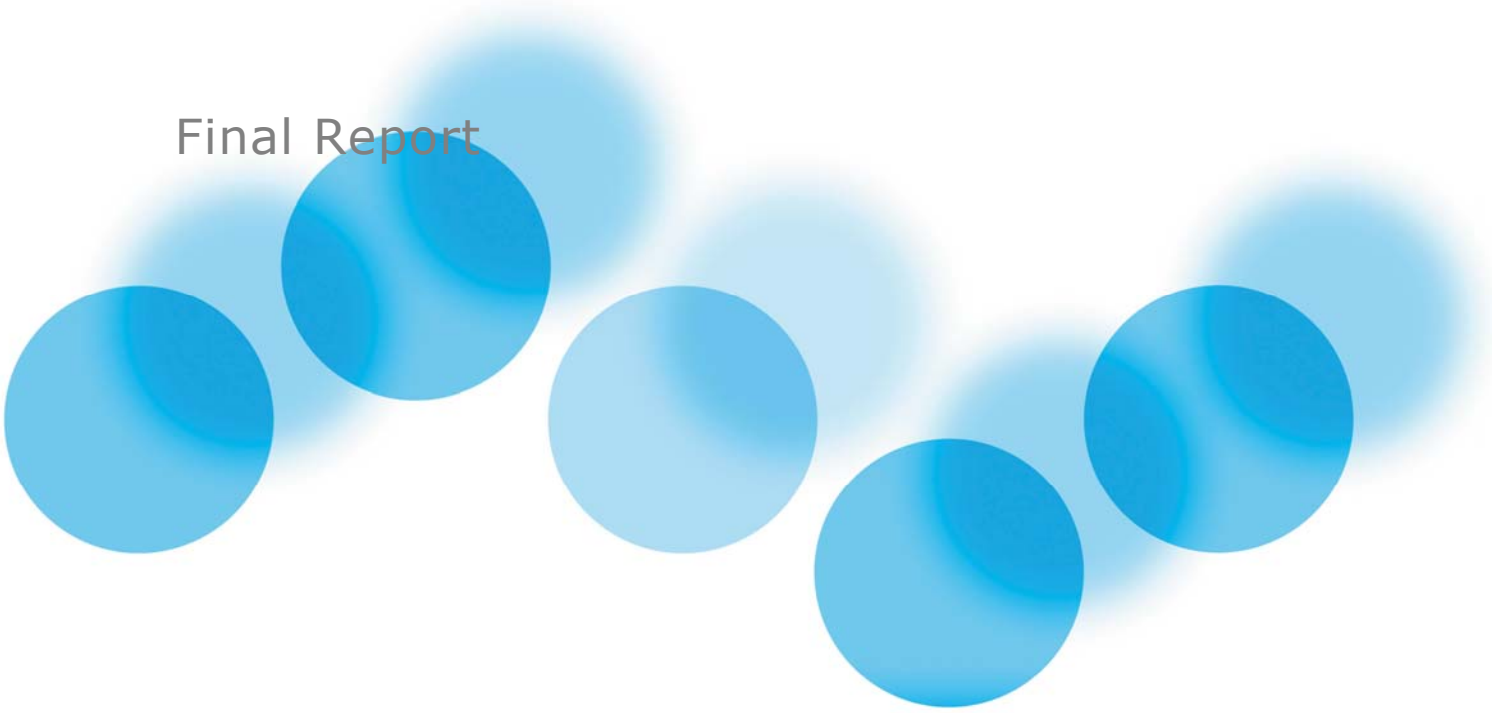
PROJECT

January 2007

REDUCTION OF POLLUTION RELEASES THROUGH AGRICULTURAL POLICY CHANGE AND DEMONSTRATIONS BY PILOT PROJECTS

Final Report



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WORKING FOR THE DANUBE AND ITS PEOPLE

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REGIONAL
PROJECT

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PREFACE

This document is the Final Report of the Project, covering the period August 2005 to December 2006.

The overall goal of the Danube Regional Project (DRP) is to improve the environment of the Danube River Basin, protect its waters and sustainably manage its natural resources for the benefit of nature and people.

The DRP helps 13 Danube countries implement the Danube River Protection Convention primarily through reducing nutrient and toxic pollution and strengthening trans-boundary cooperation in the most international river basin in the world.

The overall objective of this Project is to reduce the pollution from agriculture. The work builds on earlier studies and improves the linkages between key EU policy instruments including Water Framework Directive, Nitrates Directive, the Common Agricultural Policy etc. within the basin.

This Project is a continuation of work begun in Phase 1 of the DRP, and the outputs and outcomes from the initial phase were utilized and further developed in the Project.

The Project assists the DRB countries (especially in the lower Danube basin) with the development of pilot programmes for agricultural pollution reduction and low-input agriculture, in line with existing and emerging (driven by EU Accession) national environmental legislation.

The Project addresses two DRP Outputs:

- Agricultural Policy (DRP Output 1.2)
- Pilot projects (DRP Output 1.3)

The activities in the reporting period relating to Agricultural Policy have been targeted at:

> Task 1: Analysis of Current Legislation and Enforcement

> Task 2: Review of Agrochemical Inventories

> Task 3: Best Agricultural Practice

> Task 4: Dissemination of New Agricultural Pollution Reduction Concepts

The activities in the reporting period relating to pilot projects have been targeted at:

> Task 5: Preparing Detailed Work Programme for Pilot Projects

> Task 6: Implementing Agreed Pilot Project

> Task 7: Pilot Project Training and Demonstration Workshops

The purpose of this report is to present the Project focusing on:

- Status/results
- Problems encountered/Challenges
- Lessons learned
- Recommendations

The report includes a CD with:

- The Final Report in word format
- Technical Reports
- Reports on Analysis of Current Legislation on Agrochemicals and Enforcement elaborated by the project partners in the 7 lower Danube countries
- Reports on training activities in the 7 lower Danube countries elaborated by the project partners in the 7 lower Danube countries
- List of training and dissemination activities of the project
- Pictures from the implementation of the Project
- Videos from the implementation of the Project
- Minutes of meetings
- Workshops by the Project

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ABBREVIATIONS

BAP	Best Agricultural Practice
CISTA	Central Institute for Supervising and Testing in Agriculture, Czech Republic
CoGAP	Code of Good Agricultural Practice (Nitrates Directive)
DAAS	Danish Agricultural Advisory Service
daNUbs	Nutrient Management in the Danube Basin and its Impact on the Black Sea
DRB	Danube River Basin
DRP	Danube Regional Project
DRPC	Danube River Protection Convention
EG	Expert Group
EMIS EG	Expert Group on Emissions
EU	European Union
EU WFD	EU Water Framework Directive
FAS	Farm Advisory System
GAEC	Good Agricultural and Environmental Condition
GEF	Global Environment Facility
GIS ESG	Expert Sub-group on Cartography and GIS
GIS	Geographical Information System
GAP	Good Agricultural Practice
IACS	Integrated Administration and Control System
ICPDR	International Commission for the Protection of the Danube River
IPPC	Integrated Pollution Prevention and Control
IPA	Instrument for Pre-Accession Assistance
IPARD	Instrument for Pre-Accession Assistance for Rural Development related matters
ISPA	Instrument for Structural Policies for Pre-Accession
LFA	Less Favourable Areas (marginal agricultural land)
MAFWM	Ministry of Agriculture, Forestry and Water Management in Serbia
MLIM EG	Expert Group on Monitoring, Laboratory and Information Management
MONERIS	Modelling Nutrient Emissions into River Systems
NVZ	Nitrate Vulnerable Zones (Nitrates Directive)
PoM	Programme of Measures

P&M EG	Pressures and Measures Expert Group
PPP	Plant Protection Products
RBM EG	Expert Group on River Basin Management
RBMP	River Basin Management Plan
RR	Roof Report
SAPARD	Special Accession Programme for Agriculture and Rural Development
SMR	Statutory Management Requirements
TNMN Trans	National Monitoring Network
UNDP	United Nations Development Programme
WFD	Water Framework Directive
WTO	World Trade Organisation
WB	World Bank
ZAI	Zrenjanian Agricultural Institute

EXPLANATION OF KEY CONCEPTS AND CENTRAL TECHNICAL TERMS

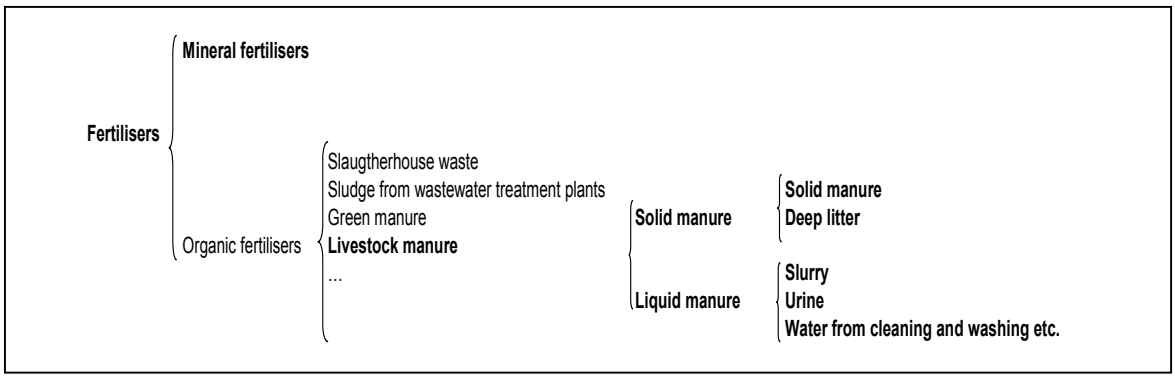
Term	Explanation
Agrochemicals	**Mineral fertilisers and chemical pesticides**
Animal Unit	**The number of livestock that produces 100 kg nitrogen in manure ex. Storage pr. year**
Best Agricultural Practice (BAP)	**The highest level of pollution control practice that any farmer can reasonably be expected to adopt when working within their own national, regional and/or local context in the Danube River Basin (from Phase 1 of the DRP)**
Extension service	**Dissemination of official information and legislation as well as scientific research and new knowledge to the farming community through mass communication, seminars or group advice. Typically organised as departments of ministries of agriculture or of agricultural universities.**
Farm advisory service (FAS)	**Individual advice and services to farmers concerning analysis and planning of all aspects of their production. Typically related strongly to the legal requirements to farming, paid by the clients and organised as Non Government Organisation, commercial company or as affiliate of farmer organisations. Includes aspects covered by the extension services as well as group advice and training activities.** **EU has recognised the value of farm advisory services by making FAS compulsory for its members, as part of the Common Agricultural Policy (1782/2003/EEC). By 1 January 2007 Member States are to set up a system for advising farmers on land and farm management.** **Farm advisory work will relate to compliance with regulatory requirements and to good agricultural and environmental conditions. The system will operate on a voluntary basis.**
Instrument for Pre-Accession Assistance (IPA)	**The European Union (EU) wants to rationalise the pre-accession aid via a new Instrument for Pre-Accession Assistance. This framework incorporates the Phare, ISPA and SAPARD system along with "structural funds" and "rural development funds" components. The objective is to prepare the candidate countries better for the implementation of structural and rural development funds after accession.**

Feed label	**Declaration of kind and quantity of nutrients in commercial animal feed**
Fertiliser label	**Declaration of kind and quantity of nutrients in mineral fertiliser**
Fertiliser norm	**Fertiliser norms are used to calculate the application amount of plant nutrients on basis of the needs of the crops and taking into account the crop rotation, the amount of plant nutrients available in the soil, soil and climatic conditions, etc.**
Field and fertiliser planning	**Planning of the crops to grow on the fields and how to fertilise them on basis of fertiliser norms and manure standards.**
Field effect	**The amount of nitrogen in mineral fertiliser that can give the same yield as 100 kg of total-N in animal manure the first year after application in percent.**
Livestock manure	**See figure 'Fertiliser terminology' below**
Lower Danube countries	**Croatia, Bosnia & Herzegovina, Serbia, Romania, Bulgaria, Moldova, Ukraine**
Manure, liquid and solid	**See figure 'Fertiliser terminology' below**
Manure standard	**A manure standard describes on basis of the most common animal types, housing systems, bedding types and productivity levels the dry matter content and content of N, P and K in the manure produced per produced animal per year, expressed ex storage. Practice shows, that such manure standards must be developed country wise in order to be precise enough.**
Milk recording	**Recording of daily milk production per cow per farm, used to estimate the feeding requirements of dairy cows**
Mineral fertiliser	**See figure 'Fertiliser terminology' below**
Nutrients	**This Project is dealing with the macronutrients nitrogen, phosphorus, potassium, with focus on nitrogen from manure.**
Nutrient balance	**Balance between nutrient input and output. Understanding the whole farm's nutrient balance as well as the sources of nutrient inputs is critical to identifying a nutrient management strategy for achieving an economically and environmentally sustainable operation and to quantify possible**

	economical or pollution-related problems.
Plant Protection Product (PPP)	**Pesticides**
Resource economy	**Comparison of costs of farm inputs and related outputs as measurement for economic success, in this Project mainly regarding N, P and PPP**
Soil classification	**A soil classification system is used to provide generalised information about the nature of a soil found in a particular location (soil structure, organic matter content, abundance of nutrients, salinisation, etc). Different soil classes react differently on fertilisation and exert different leaching risks.**

FERTILISER TERMINOLOGY

The following figure shows the hierarchy of the fertiliser terminology that is used in this report – mainly fertiliser types in bold have been dealt with and were found relevant in this Project:

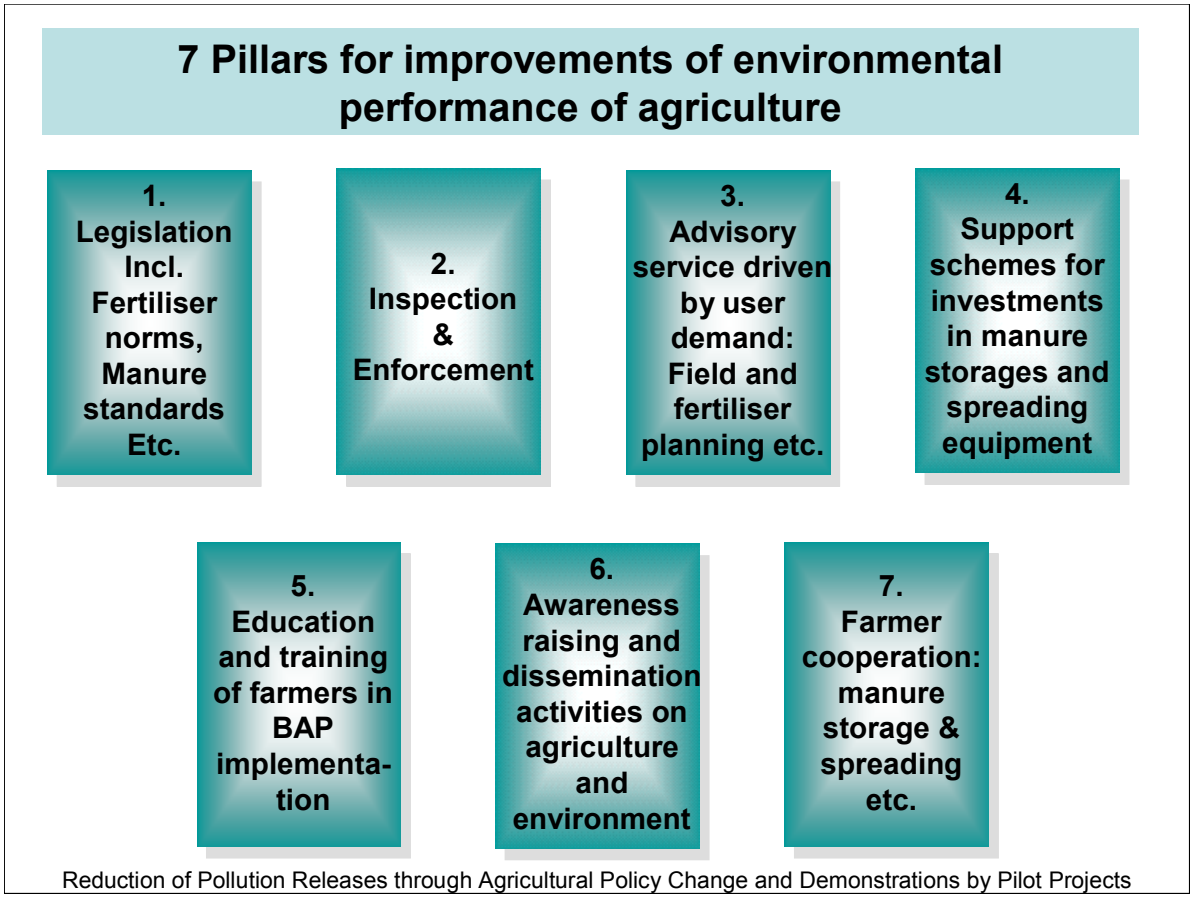


1. MAIN CONCLUSIONS

Implementing the 15 Best Agricultural Practices (BAPs) defined by this Project in the 7 lower Danube countries will result in a profound increase of the environmental performance of agriculture, and at the same time improve the economy of the farmers. The environmental benefit is calculated to cutting the loss of nutrients and pesticides to less than ½ of the loss without the implementation of the BAPs.

The Project considers the 15 BAPs of basin wide relevance - they are universal for agriculture with livestock production, most in general, some only in a temperate climate.

But the successful implementation of the BAPs requires that **all** the 7 "pillars" shown in the figure below are in place.



1. **Legislation** specifying the requirements that farmers have to meet, especially at least 6 (preferably 9 or 12) months storage capacity for animal manure. The legislation should also specify fertiliser norms for different crops and manure standards making it possible to calculate the amount of nutrients ex. storage, and the maximum amount of nitrogen pr. hectare to be supplied as animal manure.

2. An effective **inspection and enforcement system** has to be in place securing that the farmers address the legislation.

3. The implementation of the BAPs requires a technical knowledge and the use of tools that require advice from experts. To address this issue a **Farm Advisory Services** driven by farmer demand and with services accountable to the users has to be in place.

4. Manure storages and manure spreading equipment require big investments, and have a long pay back time, so many farmers will not be able to finance the investments. **Support schemes** for investments in manure storages and spreading equipment on e.g. 50% of the investments have to be available.

5. To understand the economic and environmental benefits of implementing the BAPs **education and training** of farmers and advisory services in BAP implementation are needed, and demonstration farms showing practical implementation of BAPs are recommended.

6. The **awareness** on the impact of agriculture on environment has to be increased both among farmers and in the public in general, to support the political understanding of the need to address the issue.

7. **Cooperation among farmers** to share the investments in manure storage and equipment for spreading the manure will substantially decrease the investments needed for the individual farmer as the investments in manure storage capacity are substantially smaller pr. m^3 manure for large storages than for small, and spreading equipment can be easily shared among several farmers.

The implementation of the BAPs requires focus on the issues above from the politicians and decision makers in the countries supported by an agricultural strategy with focus on a decrease of the loss of nutrients and pesticides from agriculture. The timescale needed to implement the BAPs will be shortened if support is available from international donors and International Financing Institutions and focus from EU during the accession process that includes several of the 7 lower Danube countries.

1.1. ICPDR's role in the way forward

The recommendations of the Project regarding ICPDR's role in the way forward are outlined in the following. The Project recommends ICPDR to focus on five main issues:

1. Facilitate dialogue with the agricultural society and political decision makers.

2. Support the drafting of legislation, and strengthen permitting, inspection and enforcement.

3. Facilitate the establishment of support schemes for investments in manure management and advisory services.

4. Coordinate donor interventions.

5. Consider the whole Danube basin as one zone, draining into waters vulnerable to pollution from nitrogen

The interventions of ICPDR could include the lower Danube countries (to optimise the focus – this is the recommendation of the Project) or include all Danube countries to optimise information exchange and mutual inspiration.

1. Facilitate dialogue with the agricultural society and political decision makers

The approach of the Project was that the agricultural society is open for the discussion on how to optimise their environmental performance, as there are advantages for the farmers in this optimisation both form a the optimisation of resources and improvement of economic performance on farm level and in more general for he export of agricultural products and for the public image of agriculture.

A common understanding between "water managers", the agricultural society and political decision makers on the way forward is are needed. It is recommended that ICPDR facilitate the dialogue between these three groups.

2. Legislation, permitting, inspection, enforcement

Dialogue and common understanding are crucial but not sufficient. Legislation, permitting (primarily for big farms), inspection and enforcement have also to be in place. This means that there is a big challenge in restructuring and training the institutions responsible for permitting, inspection and enforcement and secure that they are adequately staffed. It is recommended that ICPDR supports the political understanding of this needs, the allocation of resources and training.

3. Support schemes for investments in manure management and advisory services

As support schemes to the advisory service and investment in manure storage and spreading of manure are crucial for the future environmental performance of agriculture, ICPDR could initiate that experience on these issues are exchanged between the Danube countries, and some general recommendation on the these issues elaborated (se also the section on donor project below).

4. Donor projects

Some crucial technical gaps for BAP implementation were identified – many of these suited to be addressed by donor projects, e.g.: Countrywide standards (manure etc.), tools for planning of crop or livestock production are needed (e.g.: software for field and fertiliser planning, for nutrient balance) and organisation needs. These should be addressed by multi-country donor projects, and ICPDR could go into dialog with the donor community to facilitate and coordinate between donors (incl. EC, WB and SIDA) who could be interested in supporting such projects.

5. The whole Danube basin as one zone, draining into waters vulnerable to pollution from nitrogen

If the transitional or coastal water bodies at the outflow of the Danube into the Black Sea, or the Black Sea proper is identified in line with the WFD as water body (or bodies) at risk due to pollution with nitrogen from the Danube, ICPDR should approach its member states to secure that their part of the basin is defined as vulnerable zone as defined in the Nitrates Directive.

This means that DRB states should establish the code or codes of good agricultural practice and that these codes should apply for the whole basin, and that action programmes in order to reduce water pollution from nitrogen compounds in the whole basin established and implemented (requirements of the EU Nitrates Directive).

The code or codes of good agricultural practice and action plans should include the BAPs defined by this Project.

2. SUMMARY

The Project considers the 15 BAPs of basin wide relevance - they are universal for agriculture with livestock production, most in general, some only in a temperate climate. Each region needs to develop their own CoGAPs taking offspring in these BAPs and adding codes relevant for the local conditions or underpinning different issues, for instance hill farming, etc.

In the following a short summary of the Project will be provided under the headlines:

1) Status/results
2) Problems encountered/Challenges for the future
3) Lessons learned
4) Recommendations

This report includes a CD with the material about the project: Reports, minutes, pictures etc. The folder includes two videos:

1. Movie about pilot project made by RTS Television in Serbia
2. The Best Agriculture Practise **– incl. building of a manure pad, produced by the Project.**

with information about the Pilot Project. The films and other material can also be downloaded from the project homepage: http://www.carlbrodrp.org.yu/.

2.1. Status/results

The main result of the Project was setting up 15 BAPs with big replication potential in the lower Danube countries and very big impact on the loss of nutrients and pesticides if implemented.

The results of the Project can be grouped under the headlines:

A. Pilot Project
B. The potential benefits of BAP to pollution reduction
C. Agricultural policies
D. Dissemination activities
E. Follow up projects

A. Pilot Project

Eight commercial family farms, all with livestock production, were included in the Pilot Project.

The practical approach of the Project with focus on the situation on the farms and on the experiences of the farmers combined with focus on the positive aspects of BAP on farm economy was very well perceived by the Pilot Project farmers.

The physical results of Pilot Project are:

- One manure pad established on a dairy farm
- Locked stores for pesticides established on 5 farms.

From the very start of the Project there was a positive dialogue and good cooperation between the project team and the 8 Pilot Project farmers. The farmers were very motivated to participate in establishing manure storages and the training and other activities of the Project. The farmers needed some time to realise the advantages of implementing BAP on their farms and to understand the economic advantages they can expect from especially good livestock manure handling. By the end of the Project the farmers indicated a great interest in the continuation of the Project especially the construction of manure storages and optimising of crop production.

A similar positive dialogue and good cooperation with the authorities, the Ministry of Agriculture, Forestry and Water Management and the Provincial Secretariat for Agriculture in Voivodina was experienced. It was the impression of the project team that the activities of the Project were perceived by the Ministry of Agriculture, Forestry and Water Management as an integrated part of their overall activities.

B. The potential benefits of BAP to pollution reduction

The Project has estimated that the introduction of the 12 BAPs dealing directly or indirectly with livestock manure management in the 7 lower Danube countries would save the environment for 557,000 tonnes of nitrogen and 90,000 tonnes of phosphorus with the present production in agriculture. However, as the livestock production and productivities are expected to be "normalised" in the lower Danube countries after a period of transition, the effect would rather be 1.1 million tonnes of nitrogen and 163,000 tonnes of phosphorus.

Similarly the Project has estimated that the introduction of the 3 BAPs dealing with pesticides is saving the environment and the food chain from 22,800 tonnes pesticides with the present consumption and 52,000 tonnes in a situation with a "normalised" production in agriculture and a "normal" consumption of pesticides.

C. Agricultural policies

The overall approach of the Project: To establish a close dialogue with the farmers and agricultural society plus stressing the advantages of BAP implementation for the farm economy as well as for the environment and its long term possibilities for the individual farm and the Serbian agricultural production in general, proved very successful.

D. Dissemination activities

The approach and results of the Project were broadly disseminated in Serbia and the 6 other lower Danube countries as an integrated part of project implementation and by the project partners in the 7 countries. The comprehensive dissemination and training activities included: Comprehensive media coverage (TV, Journals); Workshops and lectures; BAP seminars and field days; Workshops, seminars, field days; BAP workshops and training for farmers, local authorities and others, partly with participation of mass media; Seminars for farmers and extensionists on BAP; Training workshops for Pilot Project farmers and local advisors, excursions, training of trainers.

For further information see chapter 12: "Dissemination and training activities" and the attached CD.

F. Follow up projects

Some crucial technical gaps for BAP implementation were identified – many of these suited to be addressed by donor projects:

Need for countrywide standards:

1. Soil classification
2. Fertiliser and feed norms
3. Manure standards
4. Standards for construction of manure storages addressing local situation and handling of manure in the stables.

Further tools for planning of crop or livestock production are needed e.g.:

1. Software for field and fertiliser planning
2. Software for nutrient balance calculation
3. Software for planning of cattle feeding.
4. Software for planning of pig feeding.

Organisation needs:

1. Farm advisory service
2. Inspection and enforcement systems

These needs are as far as the Project is informed also found in the other 7 lower Danube countries, whether to establish standards and organisations or to develop advisory tools, or to strengthen and develop what exists today.

Project ideas to fill some of the gaps by donor interventions were elaborated by the Project, and they can be found at the end of the report (Chapter 14.: "Follow up projects – Project ideas").

2.2. Problems encountered/Challenges

There was too little time and also the budget (600,000 USD) was rather small compared with the comprehensive requirements outlined in the Terms of Reference for the Project. There were allocated 16 months for the implementation of the Project where experience from the Pilot Project shows that at least 2½ years and preferably 3 years are needed to implement a pilot project and related training activities. During the 16 months of implementation the Project was running training and dissemination activities on BAP in all 7 lower Danube countries. As these training and dissemination activities were running parallel with the Pilot Project implementation, the experiences from the Pilot Project could not be fully integrated in the training.

The cooperation with the local Extension Service (Zrenjanian Agricultural Institute) did not reach the expected level and did not fulfil the expectations of the Project as described in the written agreement with the Institute. The Institute had limited experience with (and interest in) face to face advisory activities to the Pilot Project farmers on their farms. We have to recognise that extension services in general are not suited for these purposes. Their expertise is merely related with mass communication of messages from research institutions and authorities, here under writing articles, organising conferences and seminars, doing training, doing group advice, preparing leaflets etc. Probably the reasons for the lack of smooth cooperation between the Project and the local Extension Service related with lines of command, lack of funds, priorisation of activities and the immanent restructuring of the extension services.

One of the main challenges for the Project was to establish manure storages for the manure from the 8 Pilot Project farms. Both, the Ministry of Agriculture, Forestry and Water Management and the Provincial Secretariat for Agriculture in Voivodina, had support schemes also covering such investments. The Project supported the Pilot Project farmers in applying for the support schemes of Provincial Secretariat for Agriculture in Voivodina but the whole process was cancelled for unknown reasons.

A possible extension of the Project will address this issue as there will be new support schemes in 2007 (for further information see chapter 2.4: ”Recommendations” below).

The Project has experienced a general awareness of the need of a real Farm Advisory Service capable of addressing farmers’ needs individually and giving on site advice among the decision makers in the lower Danube countries. Several donor projects have focus on this issue in the lower Danube Basin countries, but still great efforts are needed to establish and support these services for the former communist countries in the lower Danube Basin.

The Project experienced a lack of capacity in the institutions responsible for inspection and enforcement on the farms and in the industry selling agrochemicals and feedstuff to the farms.

2.3. Lessons learned

Some of the important lessons learned are:

- Broad ownership to the BAP approach and the specific BAPs by political parties and agricultural society is a must for improvements of the environmental performance of agriculture.

- The overall approach of the Project: focus on the economic benefits of BAP for the farmers proved to be a very effective basis for dialogue and for practical interventions.

- It takes time to establish understanding with the farmers and agricultural society. In general ½ a year should be allocated for dialogue and training.

- Excursions to other areas in the country in question, to farmers that have implemented some good practices (often in relation to donor projects) and countries with a high standard agricultural production are a good source of inspiration.

- Agricultural experts, farmers and the farming society in general have great interest and motivation to improve the environmental performance of agriculture.

- Implementation of pilot projects that can be used for demonstration purposes have a great potential to spread BAP at national and/or regional levels.

Rules and verifiable standards are necessary as basis for an inspection and enforcement system and should include:

- definition of the maximum livestock density per farm (defined as maximum production of N in livestock manure ex. storage per ha of agricultural land available for the farm)
- manure standards for each country to determine the amount of N in manure ex storage from a given animal production
- determination of minimum capacity of livestock manure storage facilities
- fertiliser norms based on the needs of the crops and taking into account the crop rotation, the amount of plant nutrients available in the soil, soil and climatic conditions, etc.
- definition of periods, where no fertiliser may be applied
- labelling of mineral fertilisers (declaration of kind and quantity of nutrients)
- technical certificate of proper functioning of spraying equipment
- plant protection license for farmers and suppliers
- system for registration of pesticides and regulation of the marketing of pesticides including annually updated list of registered pesticides from official pesticide authority, specification of information that has to be provided on pesticide labels like kind and quantity of active ingredients and recommended crops
- labelling of animal feedstuffs and regulation of unwanted ingredients and additives in animal feeds.

2.4. Recommendations

The Project sees a possibility to gain further valuable experiences in a Danube Basin wide context in continuing the Pilot Project activities in order to build on the momentum achieved by establishing demonstration farms for the Project BAPs. The Pilot Project farmers expressed their strong interest in continuing the Project regarding issues like finalization of the financial support for building modern manure storages and use of equipment for application of manure, optimizing of crop production (from an environmental and economic point of view), exchange of practical experience on farmer-farmer and farmer-expert (lecturer) basis, promotion of the usage of slurry and green manure for the benefit of the environment and the farm economy. For further information see section 14.1: " Extension of the Pilot Project" in chapter 14: "Follow up projects – Project ideas".

Other recommendations of the Project to increase the environmental performance of the agriculture in the 7 lower Danube countries are:

- As agriculture is a main activity and source of income in most of the lower Danube countries, the EU Instrument for Pre-Accession Assistance should have one of its main focuses on the challenges outlined in this report.

- Economic support should be available for:

1. Manure management
2. Farm advisory services

- More pilot projects where farmers are obliged to act as demonstration farms after finalisation of the project would be of great value.

- Farm advisory service is crucial. Before a farm advisory service is established, any activity targeting the strengthening of the advisory/extension service might fail.

- Many of the gaps identified are suited to be addressed by donor projects.

- The value of donor projects on BAP implementation is increased if they are coordinated and based on the same overall strategy.

- During the process of integrating environmental issues in the national agricultural policy focus should be on the dialogue between water and agriculture policy makers and experts – more dialogue is needed.

- Implementing BAP in the 7 lower Danube countries requires clear national strategies with broad ownership and requires long term efforts. The Serbian set-up for BAP implementation below could serve as inspiration for the 4 other non-EU countries:

1. introducing BAP to the agricultural society and the general public through education and public awareness actions
2. offering financial support for investments in BAP on farms
3. at last pressing farmers with mandatory obligations (legislation, inspection, enforcement).

Romania and Bulgaria became EU members by 1 January 2007 and the EU measures and support schemes addressing agriculture and environment are available for them, raising the possibilities for BAP implementation. Anyway the Project considers the above considerations as also relevant for these two countries.

The experiences with the implementation of the **Pilot Project** (which the Project considers to be of Danube Basin wide relevance) are:

- The defined 15 BAPs are relevant and important for all Pilot Project farms and we do not see any reason to adjust them.
- The problems and bottlenecks identified made us formulate a number of project ideas, because the spreading of the BAPs require substantial attention and financing. It is obvious that the main priorities of authorities, governments and farmers for the moment deal with other issues than agro-environment, which we have to realise, and it is therefore necessary that the international community and international donors support the implementation of the BAPs.
- Awareness-raising is needed concerning livestock recording and feeding.
- A farm advisory service should be established in Serbia.
- Enforcement of the feed legislation is needed so that the feed producers and dealers label the feed correctly with information about the energy content.

The recommendations of the Project in the main text are marked with **bold** and *italic*. Further recommendations can be found in the chapters 3.1.2: "Task 2: Review of Agrochemical Inventories", 3.1.3: "Task 3: Best Agricultural Practice" in section "Challenges for the introduction of BAP", and 11.8: "Recommendations" (in relation to the agricultural extension system in Serbia).

3. PROJECT TASKS

The overall objective of this Project is the reduction of pollution from agriculture. The Project is a continuation of the work begun in Phase 1 of the DRP. This Project has especially aimed at further developing the process of agricultural policy reform and at implementing pilot projects dealing with farm practices as identified in Phase 1 of the DRP.

The Project addressed two DRP Outputs:

- Agricultural Policy (DRP Output 1.2): Reduction of nutrients and other harmful substances from agricultural point and non-point sources through agricultural policy changes and
- Pilot projects (DRP Output 1.3): Development and implementation of pilot projects on reduction of nutrients and other harmful substances from agricultural point and non-point sources.

The activities in the reporting period relating to Agricultural Policy have been targeted at:

- Task 1: Analysis of Current Legislation and Enforcement
- Task 2: Review of Agrochemical Inventories
- Task 3: Best Agricultural Practice
- Task 4: Dissemination of New Agricultural Pollution Reduction Concepts.

The activities in the reporting period relating to pilot projects have been targeted at:

- Task 5: Preparing Detailed Work Program for Pilot Projects
- Task 6: Implementing Agreed Pilot Project(s)
- Task 7: Pilot Project Training and Demonstration Workshops.

3.1. Tasks relating to Agricultural Policy

The main focus of the tasks relating to agricultural policy was to identify, for each DRB country, the main administrative, institutional and funding deficiencies and to develop priority reform measures for policies which are expected to best support the integration of environmental concerns into farm management (‘Best Agricultural Practices’), including the improvement of the handling of livestock manure and the limitation of the use of mineral fertilisers and pesticides.

3.1.1. Task 1: Analysis of Current Legislation and Enforcement

As part of this Project the status in implementing the EU rules for the agricultural sector regarding fertilisers, livestock manure and pesticides was analysed for each country within the DRB. The work (as documented in the Project’s Technical Report on: “Analysis of current national legislation about Fertilizers, Manure and Pesticides, August 2006’”) built on the achievements of Phase 1 of the Danube Regional Project, especially the reports:

- Recommendations for Policy Reforms for the Introduction of Best Agricultural Practice (BAP) in the Central and Lower Danube River Basin Countries
- Final Report for Danube Regional Project Outputs 1.2 & 1.3
- Inventory of Policies for Control of Water Pollution by Agriculture in the Central and Lower Danube River Countries.

In relation to EU the 7 lower DRB countries have been divided into three main groups; additionally, two groups of EU Member States were included in the analysis:

Lower DRB countries:

- Accession countries: Bulgaria and Romania (members by 1 January 2007
- Applicant countries: Croatia, Bosnia and Herzegovina, Serbia and Montenegro
- Other countries: Moldova and Ukraine.

EU member states:

- Old EU Member States (EU 15): Austria and Germany
- New EU Member States (EU 10): Czech Republic, Hungary, Slovak Republic, Slovenia.

The analysis of the status in implementing the EU rules was done regarding

- relevant legislation
- existing policy programmes
- current state of enforcement in each country within the DRB.

The output of Task 1 is presented as report on "Analysis of Current National Legislation about Fertilizers, Manure and Pesticides, August 2006" (see attached CD). The report is based on the project reports from the 7 project partners in the Lower DRB countries and other available information. The reports from the project partners in Croatia, Bosnia & Herzegovina, Serbia and Montenegro, Romania, Bulgaria, Ukraine and Moldova are available as separate files on the CD attached to this report.

Relevant legislation and existing policy programmes

Not surprisingly there are big differences among the 7 lower Danube countries. The legislation is different in all of the 7 lower Danube countries and they have not yet developed clear agro-environmental strategies, although the countries are adapting to the EU strategies. All have received some technical assistance from different donors to establish a policy to encourage a comprehensive agro-environmental strategy and Bulgaria and Romania have reached a high level of provisions in comparison with the EU acquis. However, it seems that there is a big gap between the provisions and the actual enforcement and control in each country.

Of the lower Danube River Basin countries Bulgaria and Romania are at the moment members of the EU.

The European Union (EU) wants to rationalise the pre-accession aid via a new Instrument for Pre-Accession Assistance (IPA). This framework incorporates the Phare, ISPA and SAPARD system along with "structural funds" and "rural development funds" components. The objective is to prepare the candidate countries better for the implementation of structural and rural development funds after accession.

EU has introduced a number of regulations and provisions (IPPC – 96/61/EEC, Nitrates Directive – 91/676/EEC, Pesticides Directive – 91/414/EEC, etc.), which have to be enforced in all EU member

countries, mainly by national legislation and regulations. Some of the EU countries have more strict national provisions than others (which is allowed by the EU). As an example has Denmark only approved 83 active pesticide ingredients whereas the EU has approved more than 100. Some EU countries have not finally revised their legislation in accordance with the EU's latest environmental Directives and not all provisions are therefore enforced yet.

Current state of inspection and enforcement

Some of the lower DRB countries have adopted quite a number of laws in line with EU and international standards, but there is a general lack of implementation and enforcement in all the 7 lower DRB countries and a system for regular inspection of compliance with laws regarding pollution from agriculture does generally not exist.

In order to enforce the national agro-environmental policy it is necessary

- to define practical and verifiable standards to be met by the farmers and distributors of mineral fertiliser, animal feeds and pesticides
- to have a functioning inspection system
- to have a system of penalties to punish non-compliance with existing rules and regulations.

Executing authorities need to be assigned for all issues regarding the application and storage of fertiliser on farm level and for all issues regarding the distribution and application of PPPs, mineral fertiliser and animal feeds.

Strict rules and verifiable standards are necessary as basis for an inspection system and include

- definition of the maximum livestock density (defined as maximum production of N in livestock manure ex. storage per ha of agricultural land)
- manure standards for each country to determine the amount of N in manure ex storage from a given animal production
- determination of minimum capacity of livestock manure storage facilities
- fertiliser norms based on the needs of the crops and taking into account the crop rotation, the amount of plant nutrients available in the soil, soil and climatic conditions, etc.
- definition of periods, where no fertiliser may be applied
- labelling of mineral fertilisers (declaration of kind and quantity of nutrients)
- technical certificate of proper functioning of spraying equipment
- plant protection license for farmers and suppliers
- system for registration of pesticides and regulation of the marketing of pesticides including annually updated list of registered pesticides from official pesticide authority, specification of information that has to be provided on pesticide labels like kind and quantity of active ingredients and recommended crops
- Labelling of animal feedstuffs and regulation of unwanted ingredients and additives in animal feeds.

An official inspection system could include different levels of control by official inspectors of the respective authorities as practiced in the EU15 countries or e.g. Germany and Austria:

(1) announced visits of farms and companies selling agrochemicals or animal feeds

(2) unannounced visits

(3) visits based on suspicion of non-compliance.

On such farm inspection visits the number and types of livestock, manure storage, storage facilities for fertiliser and PPPs, stocks of agrochemicals, technical certificates for farm machinery, record keeping of farm inputs and outputs, need based fertiliser plans and the plant protection license of farmers are checked. Likewise, on visits to companies selling agrochemicals and feeds their compliance with the rules is checked. Non-compliance with the rules and regulations is punished with penalties and/or exclusion from rural development programmes.

As one example it can be mentioned, that the Czech Republic has as part of its first Action Programme for nitrate vulnerable zones installed an expert agricultural supervision system to control the main features of the programme: ban of fertiliser use in certain periods, minimum storage capacities for livestock manure, restrictions on fertiliser use with regard to soil and climatic conditions (application zones I, II, III), crop rotation, erosion control, maximum amount of 170 kg Nitrogen/ha/year as livestock manure. The Central Institute for Supervising and Testing in Agriculture (CISTA) conducts regular inspections based on valid regulation including the possibility of fines.

Based on their inspections the Central Institute for Supervising and Testing in Agriculture found that the capacity and technical condition of livestock manure storage facilities and the lack of financial resources to improve the facilities were major problems for small as well as large Czech farms. From the country reports of the 7 lower DRB countries participating in this Project and the experiences from the Pilot Project it is known, that the main key to reducing pollution from agriculture is the improvement of livestock manure storage capacity also in these countries. However, the majority of farmers in the 7 lower DRB countries simply does not have access to financing possibilities for investments in livestock manure storage capacity.

The approach to implementation and enforcement of an agro-environmental policy in the 7 lower DRB countries should therefore not only be based on inspection and punishment, but also include the possibility of direct support or other economic incentives for investments in e.g. storage facilities and spreading equipment for manure or proper handling of PPPs. Since resources for inspection and enforcement of existing rules and regulations in the 7 lower Danube countries are limited, the best and most sustainable way to encourage environmentally friendly agriculture is to convince the farmers about the economic benefits of applying BAP and to teach them to regard livestock manure as a precious farm input.

Besides the obvious need for an inspection and punishment system and a support scheme for investments, there is a range of other complex factors affecting the implementation and enforcement of agro-environmental rules and regulations. The main reasons influencing compliance with laws and low enforcement in Moldova were elaborated by the Moldovan project partner in the "Report on Moldovan Legislation and Review of Agrochemical Inventories, October –November 2005" as part of this Project (see attached CD). Some of the mentioned aspects are in principle, though not in detail, also true for other project countries. As stated in the report, there are many very good provisions in the Moldovan Law on Environmental Protection, Land Code, Water Code, etc. with regard to soil protection and agricultural pollution with nutrients and pesticides. However, enforcement is low due to a number of factors described as:

- Inherited tradition of disrespect to law

- The ever changing laws, regulations, standards, guidelines and conflict of contradicting laws
- Low dissemination of laws' contents among farmers
- Low quality mix of enforcement tools inherited from the Soviet system
- Prohibitive rather than motivating spirit of the laws
- Low institutional capacity of relevant agencies
- Low monitoring and inspection capacities of relevant agencies
- Low motivation of the ecological inspectors, who are paid their salaries with big delays and who are poorly equipped
- Poor training of the local staff of relevant agencies
- Poor communication between relevant agencies
- Low capacities for extension in agriculture
- Lack of agro-environmental practices, BAP guidelines.

If any sustainable improvement of the enforcement of laws is to be achieved, also the above mentioned issues have to be addressed in the 7 lower DRB countries.

Common Agricultural Policy (CAP) and the lower DRB countries

The existing Common Agricultural Policy (CAP) including cross-compliance, agro-environment and rural development measures of EU cannot just be transferred to other countries. The national policy has to build on the existing policy and tradition. The EU cross-compliance system can only be used directly to support agro-environment measures in Bulgaria and Romania, because it is based on a direct payment system to producers, a system which is not operative in the other 5 lower Danube River Basin countries at the moment.

In all 7 lower Danube River Basin countries there is a big need for nationally adopted investment support systems and supervision and control systems to ensure the enforcement of a national agricultural policy.

EU financial incentives for pollution control

The Nitrates Directive places a direct obligation upon farmers in the EU Member States by making it mandatory to implement Good Agricultural Practice, resulting in requirements for reductions in fertiliser application and requirements for manure storage in nitrate vulnerable zones. The Directive does not, however, provide for the possibility to offer farmers agro-environmental payments to encourage them to meet these obligations.

The implementation of the Water Framework Directive, supported by the Market Support Measures (Pillar 1) and the Rural Development Measures (Pillar 2) under the EU CAP, and the introduction of the concept of Cross Compliance now offer good opportunities for supporting the control of nutrient and other agrochemical pollution in the Danube River Basin for those countries that are EU member States.

The EU Rural Development Regulation 1257/1999 (the "Second Pillar" of the CAP) makes provisions for EU Member States to encourage more environmentally-friendly farming methods, including practices

and actions that reduce the risk of agricultural pollution. This offers a good opportunity for financial investment support to the new EU Member States Romania and Bulgaria, by allowing them to develop EU co-financed schemes that:

a) offer grant-aided investment (up to 50%) in agricultural holdings that helps to "…preserve and improve the natural environment" – for example, by purchasing new manure storage facilities or purchasing more up-to-date equipment for mineral fertiliser and manure application

b) training farmers for the "…application of production practices compatible with the maintenance and enhancement of the landscape and the protection of the environment" including (1) training for organic farming and (2) training for farming management practices with a specific environmental protection objective

c) introducing agro-environment schemes that offer area payments to support "…agricultural production methods designed to protect the environment and to maintain the countryside" – this is a very important tool for supporting the adoption of organic farming, as well as other pollution control techniques such as uncultivated buffer strips, conversion of arable to pasture land and the introduction of more diverse crop rotations.

For those of the lower DRB countries entering the EU Accessions process, as Croatia, Montenegro, Serbia and Bosnia and Herzegovina, financial assistance will available for developing and implementing "pilot" agro-environment measures with co-funding from the Special Pre-Accession Programme for Agriculture and Rural Development (SAPARD) and the future Instrument for Pre-Accession Assistance.

Additionally, following the agreement on proposals arising from the recent Mid-term Review of the CAP a new "meeting EU standards" measure will be introduced to "help farmers adapt to the introduction of demanding standards based on EU legislation "concerning the environment, public, animal and plant health, animal welfare and occupational safety". This is potentially a very useful tool for reducing pollution and some of the acceding countries are proposing to make extensive use of it to improve manure storage and management facilities on farms.

Financial and technical support to improved legislation and enforcement

Financial and technical resources for improved legislation, inspection and enforcement of existing rules and regulations in the 7 lower Danube countries are limited. Support to develop and enforce agro-environmental policies can be obtained from various EU or other international donor programmes.

Romania and Bulgaria have become members of the EU in 2007 and are eligible to EU member state support.

Croatia will soon get extra technical and financial assistance for their preparations for EU membership and also financial support through SAPARD and ISPA. The assistance will support them in meeting the EU's legislative requirements in the agro-environmental field as well as in implementation of the measures.

Also Bosnia and Herzegovina and Serbia are on their way to become members of the EU.

Moldova and Ukraine will undoubtedly benefit from the EU Neighbouring Programme (ENP) and from other donor programmes (GEF, UNOPS, WB and bilateral donors) in the coming years and special emphasis will be on programmes for diminishing the environmental impact from farming and agro-business. The assistance will be technical as well as financial.

3.1.2. Task 2: Review of Agrochemical Inventories

In Phase 1 of the DRP, inventories on important agrochemicals (fertilisers, pesticides, etc.) were prepared. The work conducted under Task 2 of this Project reflects the findings of Phase 1 and builds especially on the following reports:

- Inventory of Mineral Fertiliser Use in the Danube River Basin Countries with Reference to Manure and Land Management Practices
- Inventory of Agricultural Pesticide Use in the Danube River Basin Countries
- Recommendations for Policy Reforms for the Introduction of Best Agricultural Practice (BAP) in the Central and Lower Danube River Basin Countries.
- Final Report for Danube Regional Project Outputs 1.2 & 1.3
- Inventory of Policies for Control of Water Pollution by Agriculture in the Central and Lower Danube River Countries.

In Phase 2 agrochemical inventories were reviewed and recommendations for the appropriate use of agrochemicals were formulated to ensure a reduction of their environmental impact. The review and recommendations covered all key issues, including

- substitution
- elimination
- further regulation of use.

The output of Task 2 is presented as report "Review of Agrochemical Inventories and Recommendations for Reducing the Impact of Agrochemicals, August 2006" (see attached CD). The report is based on the project reports, country information and statements from the 7 project partners in the Lower DRB countries, and other available information. The reports from the project partners in Croatia, Bosnia and Herzegovina, Serbia and Montenegro, Romania, Bulgaria, Ukraine and Moldova are available as separate files on the CD attached to this report.

Main sources of pollution from agriculture

Despite the relatively low levels of mineral fertiliser, livestock manure and pesticides currently applied to agricultural land in the lower DRB region compared to many EU Member States, there is a serious risk of diffuse pollution from mineral fertiliser and livestock manure application. The main sources of pollution from agriculture were identified in Phase 1 as:

- Inappropriate use of mineral fertiliser
- Poor handling of livestock manure
- Inadequate storing of livestock manure
- Inappropriate use, poor handling and storage of pesticides.

Changing farmers' management practices especially regarding use and storage of livestock manure and pesticides is therefore playing a key role in reducing nutrient and pesticides pollution from agriculture. The Project has in dialogue with the project partners elaborated recommendations on the appropriate use of mineral fertilisers including the use, handling and storage of livestock manure in order to reduce

the nutrient pollution. Likewise the Project has elaborated recommendations on the appropriate use of pesticides including the handling and storage of pesticides in order to reduce the impact from pesticide use on water pollution. The recommendations are in line with the concept of Best Agricultural Practice adopted in this Project and are the basis for nutrient and pesticide management in the Pilot Project. They are also presented in the report "Recommendations for BAP and Introduction of Concepts for the Application of BAP in the Lower DRB Countries, July 2006" and are summarized as follows.

BAP recommendations for management practices regarding use and storage of mineral fertiliser, livestock manure and pesticides elaborated together with project partners (which the Project considers to be of Danube Basin wide relevance):

- ***Fertilising shall happen on basis of a fertiliser plan that is calculated on basis of fertiliser norms in line with the needs of the crops and taking into account the crop rotation, the amount of plant nutrients available in the soil, soil and climatic conditions, etc.***
- ***Avoid application of fertiliser in periods when crop requirements for plant nutrients are low and the risk of leaching and run-off is high***
- ***Farmers are via the fertiliser plan and the fertilising of the fields obliged to document the proper disposal of the livestock manure***
- ***Apply fertilisers preferably in smaller quantities at regular intervals to match more closely the crop requirements for nutrients during the growing season***
- ***Ensure accurate calibration of fertiliser spreading equipment to ensure uniform and precise spreading***
- ***Use advanced application technology for livestock manure spreading***
- ***Ensure sufficient and adequate storage facilities for livestock manure***
- ***Minimize pesticide use by reducing the number of pesticide applications and the amount of active ingredient /application***
- ***Optimize spraying technique and spraying economy***
- ***Careful filling of spray tank and cleaning of sprayer, proper disposal of empty packaging and unused PPP***
- ***Improve pesticide storage and avoid leaking from storage through the use of lockable safety cabinets.***

Agricultural management and planning tools

The Project introduced the following agricultural management and planning tools. These tools can be used by farmers and agricultural advisors and should be part of the legislation.

- Field and fertiliser plan

  (Crop rotation and fertiliser plans based on norms, soil analyses, expected yield level, plant nutrients from livestock manure and mineral fertiliser.)

- Nutrient balance calculations

  (N and P balances based on farm inputs and outputs to quantify possible pollution-related or economical problems)

- Manure standards and fertiliser norms

(Important integrated parts of the field and fertiliser planning tool and the nutrient balance calculation tool. Manure standards and fertiliser norms must be developed for each region or country in order to comply with different climatic conditions, production systems, productivities etc.)

- Standards for design and construction of livestock manure storage facilities

  (One technical plan for a proper livestock manure pad addressing the local situation for milk producing farms was prepared by a certified architect for the Pilot Project).

Further issues proposed to be addressed via regulations, inspection and enforcement

- Regulation of the maximum number of livestock per unit of agricultural land (e.g. N from livestock manure must not exceed 170 kg/year)
- Requirements for minimum capacity of livestock manure storage facilities (minimum storage capacity to cover winter period)
- Restriction of time of field application of manure and slurry (no application on frozen ground, no application outside the growing season)
- Labelling of mineral fertilisers and pesticides
- Definition of standards for safe storage of pesticides
- Mandatory training of farmers in proper use and storage of pesticides/license for persons using and distributing pesticides
- Registration procedures for pesticides including microbiological pesticides to guarantee quality standard and ecotoxicological safety and definition of pesticide cut-off criteria for the approval of pesticides (persistent pesticides should not receive authorization)
- Availability of a current list of all authorised products for use by distributors and advisors
- Development of National Codes of Good Practice for pesticide use
- Development of an efficient inspection system including a punishment system for non-compliance with the agro-environmental laws.

Information and training needs

The following issues regarding information and training are seen as crucial for the implementation of BAP in the lower DRB countries:

- Development of a strong and competent farm advisory service, that can encourage and train farmers in the proper use and storage of fertiliser, livestock manure and pesticides
- Development of BAP guidelines
- Awareness raising about proper use of pesticides and livestock manure.

Investment support

Investments in livestock manure storage facilities and spreading equipment are very expensive in relation to the farm income of the Pilot Project farmers and small and medium size farmers in all lower Danube countries. Support to investments can come from:

- Availability of investment support schemes for improvements of storage capacity for livestock manure and equipment for spreading
- Encouragement and support of farmers' cooperations and machinery rings in order to make large farm investments affordable also to small farmers.

Possible sources of funding for investments in livestock manure storage facilities and spreading equipment are different for the 7 lower Danube countries depending on the existence of national support schemes and on their status regarding EU membership/accession. Serbia for example has a national funding scheme for investments in rural development which supports livestock manure storages and spreading equipment and is administrated by the Ministry of Agriculture, Forestry and Water Management (see chapter 8.6: "Support schemes"). Respective possible EU funding sources are outlined in chapter 3.1.1: " Task 1: Analysis of Current Legislation and Enforcement".

In order for the farmers of the respective lower DRB countries to be able to meet the requirements connected to application for funds provided by EU under CAP and SAPARD, guidelines for BAP have to be developed by the national governments including the definition of standards and requirements as mentioned above.

Parallel to supporting legislators in preparing guidelines and standards and developing investment support schemes, encouragement of farmers' cooperations and machinery rings should complement the efforts to reduce agricultural pollution through improved storage facilities and spreading equipment for livestock manure and other agrochemicals. Project ideas addressing the development of BAP guidelines and standards and the support of farmers cooperations are presented in chapter 14: "Follow up projects – Project ideas".

Generally it is important to get the agricultural community actively and positively involved in reducing the environmental impact of mineral fertiliser and livestock manure by stressing the economic benefits of improving the use of fertilisers for the farmers. Farmers need to understand that livestock manure, if applied properly, can partly substitute mineral fertiliser. Proper use and handling of fertiliser will increase the efficiency and profitability of crop production and reduce the environmental impact of nutrient pollution. Systematic training of civil servants, extension/advisory services, farmers and employers in the agricultural sector is needed to support the changes.

Integrated Pest Management

The Project recommends the encouragement of Integrated Pest Management (IPM). IPM is the coordinated use of pest and environmental information along with available pest control methods, including cultural, biological and chemical methods, to prevent unacceptable levels of pest damage by the most economical means, and with the least possible hazard to people and the environment. IPM includes:

- Use of resistant varieties
- Use of crop rotation
- Cultural practices/thorough soil cultivation/optimum seed bed

- Use of healthy seed
- Use of action thresholds for spraying decision.

The concept of IPM was introduced to the EU15 countries more than 20 years ago and is today a generally accepted and practiced way of plant protection and certainly has contributed to a reduction of pesticide use in agriculture. IPM combines environmental advantages by reducing the use of pesticides with optimizing economic benefits for the farmers and is therefore a self-supporting concept. It is, however, necessary that the farmers understand how IPM works and that they have a basic knowledge on the most common pests and crop development. It should be the task of the farm advisory and extension service in the DRB countries to make the farmers aware of the advantages of IPM and to educate them in how to do IPM. This in turn makes it necessary that a functioning farm advisory and extension service is existing and capable of teaching farmers in IPM.

Organic farming

Organic farming refers to agricultural production without use of mineral fertiliser and synthetic pesticides. Instead, organic farming relies on developing biological diversity in the field to disrupt habitats for pest organisms, and the purposeful maintenance and replenishment of soil fertility. Organic farming could therefore be an excellent contribution to reduce or even eliminate environmental pollution from pesticides in the lower DRB. Moreover, organic farming would also contribute to the diversification of farming systems.

Organic agricultural production and a system for marketing of organic products are not well developed in the lower DRB. In order to support organic farming in the lower DRP countries, a number of issues have to be addressed:

- Development of a strategy to support organic and special quality agricultural production
- Building of national capacities for specific certification, production and research requirements
- Development of a certification system
- Rules for conversion
- Rules for certification and control
- Strengthening of marketing possibilities
- Awareness for the nutritional and environmental benefits of organic farming has to be raised in farmers and consumers
- Establishment of a fund for promotion of Organic/Ecological farming aiming at subsidizing farmers during conversion.
- Systematic training of civil servants, advisory services, farmers and employers in the agricultural sector on organic farming.

Awareness raising and information

As mentioned in chapter 3.1.1: "Analysis of Current Legislation and Enforcement", the resources for inspection and enforcement of existing or new rules and regulations in the 7 lower Danube countries are limited. Efforts regarding enforcement of rules should therefore largely focus on a positive dialogue with

the agricultural society (incl. the farmers) emphasizing the economic and environmental benefits for each individual farm instead of on punishment.

As a starting point for such a positive dialogue it is crucial to raise awareness among farmers about environmental pollution from livestock manure and pesticide mismanagement by simple and easy to understand information materials, combined with well-targeted publicity campaigns. Key issues for awareness raising are the possible economic advantages of proper use of manure and pesticides and the importance of proper storage and usage of manure as well as storage, handling and disposal of pesticide products. Retail stores, extension services and other organizations working with farmers can serve as effective distributors of information.

3.1.3. Task 3: Best Agricultural Practice

The work conducted under Task 3 of this Project reflects the findings of Phase 1 of the Danube Regional Project and builds especially on the following reports:

- Recommendations for Policy Reforms for the Introduction of Best Agricultural Practice (BAP) in the Central and Lower Danube River Basin Countries.
- Final Report for Danube Regional Project Outputs 1.2 & 1.3
- Workshop on Promoting Best Agricultural Practice in the Danube River Basin, 6 – 7 October 2003, Zagreb, Croatia
- Workshop on Developing Pilot Projects for the Promotion of Best Agricultural Practice in the Danube River Basin, 19 – 20 January 2004, Bucharest, Romania

Focus in Phase 1 of the Danube Regional Project was on the use of agrochemicals. In line with EU policies and based on the following observations from the Pilot Project farms and country-specific traditional, social and economic issues this Project considered as well the handling of manure as a central issue in BAP implementation in the lower Danube countries. The observations and considerations in Phase 1 of the Danube Regional Project were:

- Manure management is the key challenge in relation to BAP for livestock farms.
- Presently the utilization of the nutrients in the manure for crop production is very low, implying that the majority of nutrients ends as pollution in surface water and groundwater.
- The issues as lined up in Phase 1 in the "Red Zone" (Discharging manure directly to water courses) and the "Blue Zone" (Restrict manure application to periods of active crop growth etc.) can only be addressed if interventions target the "Green Zone" (Investment in new storage/treatment facilities). It is only through the necessary storage capacity and equipment for spreading manure that the economic benefits in relation to the use of the nutrients in manure for the farms can be realized, so that the nutrients in manure are used for crop production and do not end as pollution.
- Plant protection products are often used in inadequate quantities and kinds, due to a lack of knowledge. The benefit from using plant production products is therefore rather low. Wrongly applied pesticides in high dosages or the use of not registered pesticides are polluting the environment. Spraying equipment is often in a poor condition due to lack of maintenance and adjustment.

- Inadequate storage of plant protection products, cleaning of spraying equipment and disposal of leftover spray solutions are contributing a lot to pollution of surface water and groundwater.

The observations on the Pilot Project farms of this Project support the statements from Phase 1 as outlined above.

In this Project a concept for the application of Best Agricultural Practices in all DRB countries was further developed based on the concept of Phase 1 and introduced in the Pilot Project. The concept and introduction of BAP took into account country-specific traditional, social and economic issues related to agricultural practice, and is consistent with the objectives and practice of EU's Water Framework Directive (WFD), Nitrates Directive (ND), Integrated Pollution Prevention Control Directive (IPPC) and Common Agricultural Policy (CAP). The output of Task 3 is presented as report on "Recommendations for BAP and Introduction of the Concept for the Application of BAP in the lower DRB Countries, July 2007" (see attached CD).

Concept of Best Agricultural Practice (BAP) in DRB Context

This Project used the same definition of Best Agricultural Practice as proposed in Phase 1:

"...the highest level of pollution control practice that any farmer can reasonably be expected to adopt when working within their own national, regional and/or local context in the Danube River Basin"

Best Agricultural Practice and the Pilot Project

Using the above definition of Best Agricultural Practice (BAP) this Project has defined 15 BAPs, which in combination are expected to have a strong effect on improving farm economy as well as minimizing environmental pollution from agriculture in relation to nitrogen, phosphorus and PPPs in all 7 lower DRB countries. Because of the positive economic effect of applying these BAPs, it is anticipated that their introduction will be sustainable.

The BAPs for the Pilot Project have been formulated on basis of the Phase 1 findings and the situation at the 8 Pilot Project farms. The BAPs were selected to address issues typical for the situation of the farms included in the Pilot Project while at the same time being relevant for all 7 project countries. The defined BAPs are focusing on farm level activities and addressing farmers and agricultural advisors as prospective applicants of these BAPs.

It is the approach of this Project to address very basic BAP issues mainly in the lower and intermediate level of hierarchy, but also to include issues from the highest level of the hierarchy described in Phase 1 of the DRP in order to achieve an effective and sustainable environmental performance as a result of the introduction of BAP to the lower DRB countries.

The 15 BAPs defined for this Project can be grouped under the following headlines:

- General
- Crop production systems
- Livestock production systems
- Livestock density
- Livestock manure management

- Use of Pesticides.

General

1. There should on all farms above 5 ha and/or 5 animal units be calculated resource economy every year, latest 1 April for the preceding year, and covering at least the resource economy for N and P

Crop production systems

2. Every farm with at least 5 ha of arable crops should ensure soil sampling at least each 5 years.

3. Crop rotation and fertilising plans should be prepared for all farms above 5 ha every year latest 31 March, for winter crops latest 1 August. Fertilising plans shall be based on the expected yield level, the needs of the crops, and include both livestock manure and mineral fertiliser.

Livestock production systems

4. Livestock should be fed with rations that are correct balanced with energy, protein and minerals in relation to the productivity.

5. Cleaning of stables with water should be avoided or reduced to a minimum.

6. Watering of the livestock should happen in a way that hinders spill of water.

Livestock density

7. There should maximally be livestock corresponding to a nitrogen content in the manure of 170 kg N per ha. Manure should be sold to other farms or distributed to fields of other farms in case of a higher livestock density.

Livestock manure management

8. There should be storage capacity for at least 6 months production of livestock manure at the farm. Production systems with use of bedding material need storage capacity for both liquid and solid manure. Production systems with deep bedding can store the manure on the field for up to 6 months if the manure has a dry matter content of minimum 30%.

9. It must be hindered that rain water can dilute the livestock manure.

10. Spreading of manure in the period from 15 October till 1 March should not take place, and in any case not on to frozen land or land with a slope of more than 7°.

11. Proper technology should be used for spreading of livestock manure. Liquid manure and slurry should be spread with band laying system or be injected into the soil.

12. Livestock manure should be incorporated into the soil within 6 hours.

Use of pesticides or Plant Protection Products (PPP)

13. Spraying should be done according to the needs, and the doses take into consideration the spraying time, the development stage of the crop, the climatic conditions.

14. The spraying equipment should function properly, and it shall be ensured that the nozzles are functioning well to ensure an even spraying.

15. Plant Protection Products shall be kept in a locked store, where books are kept on the purchase and use of PPP.

Topics in relation to agriculture and environment/nature that the Project does not address

The Project does not cover all topics in relation to agriculture and environment/nature. Some topics in relation to the agriculture and environment/nature that the Project does not address are listed below:

- Loss of nutrient during the handling of manure in the stables and to the storage

- Organic/ecological farming

- Subsistence farming

- Agriculture in mountain areas and other marginal land

- Some "Bad Practices" like washing of pesticides spraying equipment with water from streams/rivers

- Soil erosion

- Agricultural enterprises based on former state farms

- Manipulation with the hydrological cycle: Irrigation, canalization/ drainage

- Environmental impact of food processing (slaughterhouses etc.).

Challenges for the introduction of BAP

The Project conducted a workshop on "Dissemination of the Pilot Project's Results -Training of Trainers" in Belgrade, 20-23 February 2006. Based on the recommendations for BAP, which the 7 project partners elaborated during the workshop, and based on observations from the pilot farms the following components were identified to be challenges for the successful introduction of BAP in the DRP countries:

- ***National strategy***

  In order to succeed with introducing BAP it is necessary that each DRB country has a clear and targeted national strategy for water protection that integrates respective laws and different policy measures and shows the necessary path to the achievement of indicated goals. The national strategies should also include the definition of the corresponding institutional framework responsible for implementation, regulatory instruments for implementation, a system of monitoring, budgets attached to the use of the instruments for implementation, means to boost the capacity of official staff to implement the strategy and means to raise farmers' and public awareness about the problem of pollution from agriculture.

- ***Political commitment, inspection and enforcement***

  All DRB countries have addressed or are about to address the main agricultural pollution issues by legislation including regulatory instruments, with the most extensive coverage of issues in those countries preparing for EU accession. However, provisions of law, although very explicit in some documents, are frequently ignored by the farmers and some agrochemical companies.

  Regulatory instruments supporting the implementation of BAP should include:

  - a system of fines or other kinds of punishment for violations of the legal provisions and the systematic monitoring and enforcement

  - a system of verifiable standards for control during inspections

- an effective and functioning inspection system.

- ***Economic Instruments***

Economic instruments to ensure the implementation of BAP may be incentives or disincentives and can be important tools for modifying the management practices of farmers and reducing agricultural pollution. The economic instruments used in the DRB countries are currently mainly disincentives due to the lack of financial resources to introduce incentive schemes.

A crucial issue for the successful implementation of BAP in the lower DRB countries is the storage capacity for manure on farms and technically more advanced equipment for spreading of manure and application of pesticides in the field. Many farmers, however, do not have the economic resources to buy this equipment or to construct appropriate storage facilities for manure.

EU-financing possibilities for incentive schemes for agricultural investments in manure storage facilities depend on the status of the DRB countries in relation to the EU. Accession countries Bulgaria and Romania can receive support for storage capacity for livestock manure and for renovation and construction of new farm buildings for animals, machinery, storage of grain and animal feeds through SAPARD (Investments in agricultural farms) and the Animal Breeding Programme. Other DRB countries can get financial support for farm investments from bilateral or international technical assistance projects.

- ***Farm advisory service/information***

The transfer of knowledge and information to farmers via an farm advisory service is playing a key role in changing the management practices of farmers and introducing BAP. It is therefore very important to have a well functioning farm advisory service system with competent staff and the financial means to conduct the advisory tasks. Some factors to be considered, when extending the capacity of the current advisory services in the DRB countries are:

- Advice and information measures for the introduction of BAP should be designed and part of the National Strategy for reducing pollution from agriculture.

- BAP guidelines for all DRB countries should be developed in correspondence to the country-specific conditions of agriculture and to country-specific traditional, social and economic conditions.

- The capacity of the advisory staff should be increased. It is important that advisors not only improve their knowledge and skills regarding technical and environmental pollution prevention, but also are made familiar with effective training and dissemination methods like for example participatory training.

- Appropriate economic instruments for promoting BAP are important in order to be successful.

- Training and information materials should be written in an understandable way and adjusted to local conditions.

- Awareness of the importance of agricultural pollution control among farmers, advisors and the public are increasing the motivation to adopt the concept of BAP.

- Cooperation between farmers should be encouraged for sharing of the costs of purchasing and maintaining of equipment for manure handling and spraying.

- ***Research and development***

A fundamental necessity for the possibility to calculate the appropriate manure storage capacity as well as the quantity of plant nutrients in the manure is the availability of national manure standards. A manure standard describes on basis of the most common animal types, housing

systems, bedding types and productivity levels the dry matter content and content of N, P and K in the manure produced per produced animal per year, expressed ex storage. Practice shows, that such manure standards must be developed country wise in order to be precise enough. Unfortunately such standards are not present in the DRB countries.

It is likewise fundamental that fertiliser norms exist, which describe the economic optimal fertilizing of the crops. Unfortunately such norms are not present in the DRB countries.

The costs for planning manure storage facilities including technical designing, approval procedures, etc. are typically very high. It would lower the price of such projects considerably if a number of standard designs were developed, which in advance get approved by the authorities and can be used by several farmers.

Introduction and development of concepts for the application of BAP

To implement the BAPs that constitute the Pilot Project in the 7 lower Danube Countries the following minimum conditions have to be met:

- BAP guidelines are existing
- Effective and affordable advisory service working in close dialogue with the farmers
- Support schemes for storage capacity for at least 6 months production of livestock manure and equipment for spreading the manure.

The application of BAP will further be effectively supported by the following:

- Pilot projects should demonstrate that through the application of BAP livestock manure can be used to replace mineral fertiliser, at least partially, and thereby contribute to a better farm economy.
- Awareness raising activities are supporting the willingness to change management practices among farmers and the motivation of the advisors and environmental inspectors.
- Support of production methods like organic farming or integrated pest management (IPM) contribute to the reduction of agricultural pollution and increase the awareness for pollution issues and the acceptance of BAP.
- Quality certificates for agricultural production applying BAP will improve marketability of produce and competitiveness.
- Effective pesticide and fertiliser monitoring and control of the black market will ensure the elimination of the use of agrochemicals, which are not authorized because they are environmentally hazardous or polluting.
- Capacity building amongst relevant stakeholders for the implementation of BAP and other agricultural pollution control policies.

3.1.4. Task 4: Dissemination of new Agricultural Pollution Reduction Concepts

The work conducted under Task 4 of this Project consisted of identifying appropriate means of disseminating the new BAP concept developed in Phase 2, and to widely disseminate the BAP concept and the results and experiences from the Pilot Project to authorities, farming communities and NGOs in the DRB.

The dissemination activities under Task 4 were linked with activities under Task 7 – "Pilot Project Training and Dissemination" to ensure the highest level of dissemination on both, agricultural policy developments and the results and experiences from the Pilot Project. The activities aimed at providing clear guidance for experts in all DRB Countries regarding appropriate policies and measures to reduce agricultural pollution and were coordinated with on-going other programmes on dissemination.

The output of Task 4 is presented as range of different kinds of dissemination materials and activities as follows.

Project homepage

To assist with the dissemination, a project internet site (http://www.carlbrodrp.org.yu/index.htm) was established from the start of the Project and continuously updated to share the Pilot Project BAPs and all relevant information on Best Agricultural Practices and experiences with the Pilot Project with interested parties. All media publications connected to the Project are listed and can be accessed from the project home page. The project homepage was also used as platform to make the BAP planning tools 'Field and Fertiliser Planning', 'Cattle Feeding' and 'Pig Feeding' available to agricultural advisors and other interested persons.

Media coverage of the Introduction of BAP and the Pilot Project

To disseminate the results of the Project and to create awareness on agriculture and environment there has been a close and continuous dialogue with the Serbian media from the very beginning of the Project. The concept of BAP was introduced and constantly promoted by Serbian TV and radio broadcasters as well as by printed media. The intensive contact with media who covered all events organized by the Project resulted in a wide range of articles published in daily, weekly and monthly agriculture magazines as well as in electronic journals and web sites of public institutions such as the Republic Ministry of Agriculture and the Institute for Nature Protection. Several TV and radio programmes covered the issue of BAP and the progress of the Pilot Project.

The Projects' campaign was further encouraged and supported by Danube Environmental Forum (DEF) and REC (Regional Environmental Centre) by presentations of the Project on their homepages. National and local media coverage was constant and based on short and long reports. Also environmental radio stations took part in the Projects' media coverage. A more detailed description of the media coverage and promotional events is found on the project homepage and in the "List of training and dissemination activities" which is available as separate file on the attached CD. For summary statistics on media coverage and events in Serbia see Table 3.1 below.

Dissemination activities in cooperation with project partners

The project partners from the other lower Danube countries organized a number of integrated dissemination activities targeted at events, media (printed, radio, TV) and Internet. They also conducted BAP training and demonstration activities in their respective countries.

An international press release was prepared together with the DRP communication experts. The press release was translated and published in June 2006 in all 7 project countries.

More detailed information on the dissemination and training activities of the project partner countries is presented in the reports on training from the project partners (see attached CD) and the "List of training and dissemination activities" (see attached CD). A summary of the number of media coverage incidences and promotional events is given in the following table.

Table 3.1: Number of media coverage incidences and promotional events in the 7 project countries

	TV and radio broadcasts	Articles in newspapers and journals	Presentations on websites	Promotional events
Bosnia & Herzegovina	2	1	1	
Bulgaria	4	18		
Croatia	3			3
Moldova	8		3	
Romania	4	2		8
Serbia	12	8	5	4
Ukraine	4	1	1	

BAP leaflet

A short presentation of BAP and its impact on the environment was drafted, translated to the languages in the 7 lower Danube countries and placed on the project homepage for downloading and printing by interested parties.

Brochure on BAP

The Project experts prepared the brochure "Best Agricultural Practices – What it is and how it can be implemented". The brochure was made based on previous experts' experiences in the field and practical experiences during the first six months of the project implementation in Serbia. The printed version in Serbian was printed in 1000 copies in August 2006. An electronic version is available on the Project's web site for downloading and printing. The official promotion of the BAP brochure took place in Belgrade in September 2006. The brochure has been distributed to the Pilot Project farmers and also to other farmers, farmer's associations, advisory services and other relevant users in Serbia.

Educational film on Pilot Project and BAP

RTS Television in Serbia made in close contact with the Project a film about the Pilot Project. The film consecutively covers the main activities in connection with implementing the Pilot Project from February to October 2006. It was several times broadcasted in Serbian TV from October to November 2006. The film, which is in Serbian language with English subtitles, can be used for dissemination and educational purposes. A download of the film is available on the project homepage ("Movie about pilot project made by RTS Television in Serbia") and on the CD that is included in this report.

Educational film on building of a manure pad as a part of the Pilot Project

A second film covering all important steps of the preparation of a concrete livestock manure pad on one of the pilot farms has been elaborated. The film is available on the project homepage for downloading ("The Best Agriculture Practise - incl. building of a manure pad") and has been presented to different media for broadcasting. Further the film is included on the CD that is included in this report. The film can be used for dissemination and training purposes.

Study tour

The Project arranged a visit to Agromek in Denmark (Exhibition on Danish agricultural equipment and machinery) in January 2006 for 40 participants from the Pilot Project area Vojvodina (12 journalists from TV and agricultural news papers and magazines, 20 farmers including farmers from Pilot Project farms, civil servants from the Provincial Secretariat for Agriculture in Vojvodina, and a representative from the Ministry of Agriculture, Forestry and Water Management in Belgrade. Included in the group were also 8 participants from Romania.

The purpose of the trip was to improve the understanding of BAP among farmers and staff from the Ministries, to give the participants a possibility to familiarize with modern farm equipment for optimum manure spreading and application of agrochemicals, to increase the visibility of the Project in the media, and to encourage the journalists to publish information on BAP and the Pilot Project in their respective media. After returning a meeting with different media was organized and a press release on the visit to Agromek was elaborated in Serbian and disseminated. The participating journalists released a number of publications on their impressions and on BAP and the Pilot Project in the media, they were attached to (see project homepage).

3.2. Tasks relating to Pilot Projects

Based on suggestions from a workshop during Phase 1 of the DRP on 'Developing Pilot Projects for the Promotion of BAP in the Danube River Basin', 19- 20 January 2004, the Pilot Project idea 'Good Agricultural Practice in the Intensive Agricultural Region of Vojvodina (Serbia-Montenegro)' was chosen as the Pilot Project to be implemented in Phase 2. The Pilot Project was expected to offer the maximum impact in terms of nutrient reduction, the best opportunity for replication elsewhere in the DRB, and to allow for a transboundary approach.

The following Tasks were completed in Phase 2 of the DRP relating to pilot projects.

3.2.1. Task 5: Preparing Detailed Work Programme for Pilot Projects

The activities under Task 5 built on the achievements of Phase 1 of the Danube Regional Project, especially the reports:

- Recommendations for Policy Reforms and for the Introduction of Best Agricultural Practice (BAP) in the Central and Lower Danube River Basin Countries
- Final Report for Danube Regional Project Outputs 1.2 & 1.

Under Task 5 of this Project a detailed work plan for the Pilot Project was prepared. Agreements with farmers participating in the Pilot Project were made. The output of Task 5 is presented as technical

report "Detailed Work Programme for the Pilot Project, February 2006" (see attached CD) and includes the agreements made with farmers participating in the Pilot Project.

Identification of Pilot Project

As a result of discussions with representatives of the ICPDR and the DRP during the project kick off meeting on 9 September 2005 and with the EMIS Expert Group during their meeting 30-31 September 2005 it was agreed to locate the Pilot Project in Vojvodina, Serbia.

Vojvodina was selected for the Pilot Project for the following reasons:

1. It was one out of 6 locations identified for pilot projects (No 6: Good Agricultural Practice in the Intensive Agricultural Region of Vojvodina) in the Consolidated Pilot Project Proposals from the DRP Phase 1 report: Pilot Projects for Promoting Best Agricultural Practice (BAP) in the Central and Lower Danube River Basin Countries: Concept and Project Proposals.

2. The area and the agricultural practices are representative for intensive agriculture in the 7 lower Danube countries.

3. It is in convenient distance from the project office in Belgrade.

Pilot Project area

The Pilot Project area Srednji Banat was chosen in dialogue with the Provincial Secretariat for Agriculture in Vojvodina because the area is intensively farmed with maize, wheat, sugar beets, soy beans, and other arable crops. Furthermore livestock production within the area is representative for the region, with especially pigs, dairy cattle and poultry production. Relatively large quantities of organic manure are produced, which consequently are potential sources of pollution. The appointed area is centred on the local centre town Zrenjanin.

Selection of pilot farms

Two overall types of farms are found in the region of the Pilot Project: family farms and agricultural enterprises. Family farms mostly possess 5-15 ha of arable land on which they grow mainly maize, wheat, sunflower, soybean, sugar beet, alfalfa and feeds for their animals. Farms usually use communal grazing land, but some also possess pastures. Arable land is mainly of high quality. Most of the cash crops are partly bartered for soy meal, sugar beet dry pulp or other similar by-products from the processing industry, which are then used on the farms for feeding livestock.

Most of the family farms have diverse livestock production, regularly comprising cattle and pig production, with minor poultry production for own consumption on the farm. These farms are often over-equipped with modern machinery and equipment but the machinery is not maintained and the farms are not able to utilise them efficiently. Farms appear often disorganised and run-down. Family farms are based on a long tradition of farming and often suffer from inherited bad habits, miss-practice, old fashioned management of land and often only survive without prosperity.

Agriculture enterprises in the region can be divided into two groups: (1) large old social agriculture 'combinates' (usually comprising primary production and processing of meat) which were recently privatized and (2) new strong large family farms. Both groups are officially registered as farms and start investing large capital in modernization of their farms without consideration for pollution from their production.

Most of the farms in the Pilot Project region, no matter how big they are, represent a serious source of pollution for the environment. Their contribution to pollution varies relative to farm size, but is important even in the case of small farms, since small farms are the predominant farm structure in the region.

Twelve farms were visited during the preparation of the Pilot Project, out of which 7 were family farms and 5 agricultural enterprises. The farms were identified in dialogue with the Provincial Secretariat for Agriculture in Vojvodina. All farms are privately owned. All were situated in the municipalities of Zrenjanin, Zitiste and Secanj in the region of Banat, eastern part of Voivodina province.

Out of the 12 visited farms 8 farms in the region were selected to participate in the Pilot Project. Selection criteria for the farms were that they should reflect the situation in agriculture of the region and represent the three typical farms types:

- dominating traditional small mixed farms above 10 ha with cattle or pigs
- medium-scale farm enterprises in development (expanding commercial farms)
- large old-fashioned enterprise farms in transition.

All of these farms were very positive towards cooperation with the Project. The 8 farms selected for further negotiations to participate were:

- 3 farms with pig production (one medium in expansion and two larger medium farm enterprises, all privately owned and in expansion)

- 2 dairy cattle farms (one small and one medium privately owned, both in expansion)

- 3 farms with mixed production, but mainly cattle dairy family farms.

A detailed assessment of the characteristics of the production of the 8 selected farms was made. The farm characteristics are presented in the report "Detailed Work Programme for the Pilot Project, February 2006" (see attached CD).

Planning of interventions on each pilot farm and agreements with pilot farmers

The interventions on the 8 pilot farms were planned in the following steps:

1. Signing of an agreement with the farmers following the workshop "BAP and Pilot Project" on 24 January 2006 in Lukino Selo in the Pilot Project area.

   Participants of the workshop were potential Pilot Project farmers, media representatives, representatives of local big farms, representatives of the MAFWM & Provincial Secretariat (rural development grant schemes), representatives from the extension service. Each farmer stipulated in the agreement which BAPs he was interested to cooperate on. The agreement is shown in chapter 5.3: "Agreement with one of the Pilot Project farmers" and in the report "Detailed Work Programme for the Pilot Project, February 2006" (see attached CD).

2. Further clarification of the possibilities and wishes during farm visits in February 2006.

3. Elaboration of a draft manure standard for the calculation of the amount of manure ex storage produced on the pilot farms according to EU rules.

4. Elaboration of full proposals for each pilot farm, including estimated costs and timing of the interventions.

5. Presentation of the interventions (manure storages, equipment for storage of manure etc.), their costs and the possibilities for economic support from the state and the Project on a meeting in Belgrade. The following possible sources for financial support for the interventions were outlined:

a. MAFWM rural development grant scheme: 30-60% of reimbursement for registered farmers up to 40 years old (optional 55 for marginal areas – in the region only Sechanj municipality) for investments in primary production and marketing, agriculture and rural economy diversification and agro-environmental work, rural infrastructure and organic agriculture

b. MAFWM investments in agriculture grant scheme: 30-50% of reimbursement for registered farmers no matter of age for investments in machinery, equipment and facilities in primary production, processing, packaging and storing

c. MAFWM subsidized credit lines, short and long term credit lines operated through commercial banks for all kinds of investments in inputs (short-term) and hardware of primary production and marketing

d. Voivodina Secretariat rural development grant schemes - agri-environmental part

Six of the Pilot Project farmers participated in the workshop "BAP and Pilot Project". A representative from the Ministry of Agriculture, Forestry and Water Management explained the procedures, timing and preconditions for getting state support for investments. Further an advisor in farm buildings from the Institute for Animal Husbandry, Belgrade, was present to supplement the project staff on the technical issues in building storage facilities for manure.

3.2.2. Task 6: Implementing Agreed Pilot Project

The Pilot Project was implemented according to the detailed work programme and the timetable described under Task 5 and as presented in the report "Detailed Work Programme for the Pilot Project, February 2006" (see attached CD).

Experiences from the implementation of the Pilot Project, problems, lessons learnt and recommendations are presented in this report in chapter 4: "Experiences from implementation of the Pilot Project BAPs and chapter 9: "Cooperation with Pilot Project farmers".

Selection of Pilot Project area and farms

Eight farms were selected to participate in the Pilot Project as described in chapter 3.2.1.

There has been a close and continuous dialogue with the 8 Pilot Project farmers on the issues described below throughout the implementation of the Pilot Project.

Agreements with pilot farmers

An agreement with 8 Pilot Project farmers in the area around Zrenjanin on their cooperation with the Project was signed in January 2006. The agreement is presented in chapter 5.3: "Agreement with one of the Pilot Project farmers" and in the report "Detailed Work Programme for the Pilot Project, February 2006" (see attached CD).

The agreement covers the following issues:

- Agreement partners, duration of cooperation
- The farm owner commits himself to respect the Pilot Project BAPs applicable on his farm including compulsory BAPs

- Costs of the implementation of the indicated BAPs are shared by farm owners and the Project
- The farm owner agrees to
    - deliver requested information for calculation of N and P balances and for the estimation of the use of PPP
    - perform the requested registrations about farm operations, hereunder registrations of purchased or used inputs in the production, sale of farm products, dates of specific operations, etc.
    - allow the organizing of open days on the farm and the use of data on the calculated or estimated economic and environmental effect of the implemented BAPs on the farm
- In case the farm owner violates this agreement or if it is terminated upon request of the farmer, then he/she is obliged to pay back the financial support already given by the Project.

After preliminary investigations on each farm, including a calculation of the necessary manure storage capacity, this contract was followed-up by a more detailed cooperation agreement based on a specific proposal for each pilot farm. A copy of the proposed agreement is presented in chapter 4: "Experiences from implementation of the Pilot Project BAPs".

Agreement on cooperation with Local Extension Service

An agreement with the local extension service in the Pilot Project area, the Zrenjanin Agricultural Institute (ZAI) on involvement of their advisers in the implementation of the interventions has been signed (see chapter 11.4: "Agreement with the local extension service and "Detailed Work Programme for the Pilot Project, February 2006"). In this agreement the commitments of the Project and the ZAI are defined.

Experiences, problems and lessons learned in connection with the cooperation with the local agricultural advisory service ZAI are presented in chapter 11: "Cooperation with the extension service".

Training of pilot farmers

There has been a close and continuous dialogue with the 8 Pilot Project farmers on all issues regarding implementation of BAP on their farms throughout the implementation of the Pilot Project. Besides, the Pilot Project farmers were trained in all examples of Best Agriculture Practice in the Project and informed about all relevant aspects of the Project. Also, they participated in a training on manure storage and handling.

The Pilot Project farmers were presented for nutrient balance calculations as well as preliminary field and fertiliser plans. They were trained in pesticide planning, including test of field sprayers, personal protection and use of reduced doses. The relevant advisers from Zrenjanian Agricultural Institute participated in the training.

Two excursions for the pilot farmers have been organized in August and September 2006. The farmers visited the Head Office of the Swedish Integrated Milk and Dairy Development Project 'Milky River' in Nis and a farmers' group in Lalinac village. This group was established by the project 'Milky River' and was very successful in organizing a machinery ring. The project staff presented its general experience regarding organizing of the farmers' group during last three years and the chief and members of the farmers' group shared their experiences with their own machinery ring.

A seminar on pig and cattle feeding has been organized by the Project at the Zrenjanin Agricultural Institute in August 2006 and was attended by the 8 Pilot Project farmers and the relevant advisers from

Zrenjanian Agricultural Institute. The institute gathered for this event also numerous farmers from Banat, a region which was not involved in the Project so far. The seminar covered the following issues:

- Advanced pig and cattle feeding

- Need for supplementary feed for cattle

- Importance of the roughage quality in cattle feeding.

Training of agricultural advisers

Training of the relevant advisers from Zrenjanian Agricultural Institute has been conducted on the principles and practical elaboration of

-Nutrient balance calculations

-Field and fertiliser planning

-Pesticide planning, including test of field sprayers, personal protection and use of reduced doses

-Milk recording and feeding planning for dairy cows

-Organization of farmers

The training took off-spring in examples from the pilot farms.

Soil analysis on pilot farms

The Project conducted soil analyses and collected data about all fields of the pilot farms in order to prepare for field and fertilisers planning. It also elaborated tables on soil characteristics in Serbia.

Nutrient balances and field and fertiliser planning

Software for nutrient balance calculation as well as for field and fertiliser planning and cattle and pig feeding, developed by the Danish Agricultural Advisory Service (DAAS) and adjusted to the Pilot Project was delivered to Zrenjanian Agricultural Institute. The software is also available on the Project's web site for downloading and using (http://www.carlbrodrp.org.yu/index.htm).

The software mentioned was several times promoted on different workshops and seminars. A strong interest in using the software was raised at the Institute for Agriculture in Zrenjanin during the training of agricultural advisers and farmers. The ZAI has understood the pragmatic value of such a programme and would like to use it in the future. The ZAI recommended some changes in the programme, to adopt it to domestic criteria and frequent problems in local agriculture. The presentation of the software for nutrient balancing and for field and fertiliser planning did not only make a positive impression in Vojvodina, but also on a national institutional level in Serbia, as the representatives from official agricultural institutions requested for the usage and implementation of the programme.

Architect design and price calculation for appropriate manure storages

An architect with specialization in farm buildings has been subcontracted and has in cooperation with the project team elaborated detailed construction plans and price calculations for manure storages for 7 pilot farms (6 objects). The construction plans were designed to address the specific situation on the Pilot Project farms (for an example of one construction plan see chapter 5: "Building of manure pad").

Application for support to manure storage

Application for financial support to manure storages from the Ministry of Agriculture or the Provincial Secretariat for Agriculture in Vojvodina has been intensely discussed with the Pilot Project farmers.

It has been agreed with 7 of the 8 Pilot Project farmers to apply for support from the Provincial Secretariat for Agriculture in Vojvodina for livestock manure storages and manure spreading equipment. The Project supported the drafting of the applications. Unfortunately the applications were not granted.

The Project finally decided to support one of the Pilot Project farmers in the construction of a livestock manure pad. For more details on the application for support and the financing of one manure pad see chapter 5: "Building of manure pad".

Slurry spreading equipment demonstration

The Pilot Project farmers posses some old machinery for spreading liquid and solid manure, but no equipment for spreading slurry. On initiative of the Project a representative of Samson Agro, a company selling slurry manure spreaders, has visited three of the Pilot Project farms and introduced the equipment of the company. Spreading of slurry with appropriate equipment is considered to be a major precondition for a high field effect. However, buying slurry spreading equipment is too large an investment for the individual Pilot Project farms and would need the organization of machinery rings.

Pilot farmers' perception of the Pilot Project

An interview with all pilot farmers about their perception of the Pilot Project was made in September 2006. The impression that the Pilot Project farmers had about the Pilot Project was generally very positive. The farmers stated that they had gained a considerable amount of new knowledge and information on modern agricultural production, both from Danish and local experts. They also pointed out that it was very useful to hear again about something which they had partly known before.

They assessed especially the following topics as being very useful: nutrition of cows and pigs, usage of slurry, financial losses due to bad manure storage and untimely manure application.

Out of the novelties they heard about and saw over the course of the Project, they have implemented:

- Soil analysis as a base for fertiliser planning

- Advices of Project experts about kind and quantity of fertiliser to apply on their fields

- Advises about the importance of cattle nutrition in relation to milk production

- Better plant protection methods.

Expectations to the Project that have not fully been fulfilled were the finalization of the financial support for building modern manure storage facilities and the procurement of equipment for livestock manure spreading. A more detailed summary of the remarks and opinions of the farmers is presented in chapter 9: "Cooperation with Pilot Project farmers".

3.2.3. Task 7: Pilot Project Training and Demonstration Workshops

Under task 7 an integrated programme of training and demonstration workshops was developed to disseminate the results of the Pilot Project. Training and dissemination activities were conducted in the 7 lower Danube countries Ukraine, Moldova, Romania, Bulgaria, Serbia & Montenegro and Bosnia & Herzegovina. All activities were used to both demonstrate the success and benefits of the Pilot Project and to provide enough training to enable the replication of key aspects of the Pilot Project across the DRB region.

Identification of training partner organizations

In each of the 7 lower Danube countries a training partner organization was identified. The partner organizations in the 7 lower Danube countries were:

1. Bosnia & Herzegovina: Agricultural Institute of Republic of Srpska, Department of Agrochemistry and Agroecology
2. Bulgaria. National Agricultural Advisory Service
3. Croatia: Regional Environmental Centre and EuroLex Consulting Ltd.
4. Moldova: National Farmers Association
5. Romania: Fundatia pentru Dezvoltare Rurala din Romania
6. Serbia: 'Natura Balkanika' Nature Society
7. Ukraine: National Association of Agricultural Advisory Service of Ukraine.

Training of trainers

A workshop was implemented in February 2006 for the representatives of all project partners with the title "Dissemination of the Pilot Project's Results – Training of Trainers". All 7 project partners of the lower Danube countries participated in the workshop including representatives from the DRP and the ICPDR.

The purpose of the workshop was to:

- Familiarize the project partners with the Project, the ICPDR and the DRP
- Identify the main administrative, institutional and funding deficiencies and draft a proposal for priority reform measures
- Present the Projects' BAP concept and to discuss BAP.
- Present ICPDR and DRP (incl. media and communication strategy) and the Project
- Discuss the appropriate use of agrochemicals
- Site visit and discuss the Pilot Project
- Prepare draft action plans for training for each country: programme, place, participants and timing.

The workshop provided the platform for good and positive discussions and exchange of views.

Action plans for training

Final action plans for training have been elaborated by all 7 partner organizations, approved by the Project and submitted to the DRP task manager.

The list of contents of the action plans includes:

- Background

- Short country status on agriculture
- Target groups for training
- Structure and schedule of training activities
- Training materials
- Methodology
- Implementation of training events
- Expected results/outcomes
- Budget
- Evaluation and reporting on training
- Dissemination (media involvement)
- Annexes

  -Tentative agenda for seminars and workshops

  -Outline of the report on the executed training activities.

Implementation of action plans for training

The training activities in the 7 lower Danube countries were implemented in line with their action plans for training. More information on the training activities of the project partners is presented in the reports on training from the project partners (see attached CD). Also a detailed "List of training and dissemination activities" of all countries is available as separate file on the CD attached to this report. A summary of the number of training activites and training participants is given in the following Table 3.2.

Table 3.2: Number of BAP and Pilot Project training activities in the project countries

	No. activities	No. participants	Comments
Bosnia & Herzegovina	15	*	Workshops and lectures
Bulgaria	26	1285	BAP seminars and field days
Croatia	6	116	Workshops, seminars, field days
Moldova	15	*	BAP workshops for farmers, local authorities and others, partly with participation of mass media
Romania	8	233	Seminars for farmers and extensionists on BAP
Serbia	15	528	Training workshops for Pilot Project farmers and local advisors, excursions, training of trainers, BAP workshops
Ukraine	2	216	BAP training and seminar

* number of participants not stated

3.3. Other activities

3.3.1. Coordination with other projects

On order to coordinate project activities and to exchange experiences and knowledge, this Project kept especially close contact to the two projects:

- Danube River Enterprise Pollution Reduction Project, World Bank funded
- Dutch-funded project working with the National Agricultural Advisory Service in Bulgaria to develop their capacity to support implementation of the Nitrates Directive (CoGAP and NVZ action programmes).

Three coordination meetings were held, on 2 March 2006, 31 May 2006 and 17 August 2006 respectively (for minutes of the meetings see attached CD), and continuous contact was kept with the Danube River Enterprise Pollution Reduction Project. Minutes of the meetings were sent to the DRP task manager. It was agreed with the Danube River Enterprise Pollution Reduction Project to coordinate and exchange knowledge especially on the following issues:

- Manure management (technical guidelines for liquid and solid manure storages and construction guidelines, equipment for spreading manure)
- Definition of manure standards
- Training of trainers in manure management and field and fertiliser planning
- Exchange experiences from training
- Farmer visits to farms involved in the "other" project
- Economic evaluation of investments to secure that they are profitable for the farmers
- Dissemination of project results to the farming society and awareness raising of the general public, policy makers, local authorities and farming society.

The draft manure standards elaborated by this Project based on the Serbian situation have on request been submitted to the Dutch-funded Bulgarian project. Further information on how the Serbian draft manure standards were elaborated has been submitted to the Bulgarian project. The Bulgarian project concluded that the standards developed by this Project for the pilot farms in Serbia are at present probably containing the most realistic available values also for Bulgaria.

3.3.2. Coordination with World Bank projects

The World Bank implements a number of projects on agriculture in the lower Danube countries where environmental issues are included. The coordination with the World Bank Danube River Enterprise Pollution Reduction Project is described above.

A few attempts to get into contact with the other WB projects in the lower Danube countries were made but with limited success.

In November – December the International Team Leader of this Project visited the World Bank in Washington to inform task managers of the World Bank project about the present Project and discuss possibilities for coordination and follow up activities (minutes on the attached CD).

3.3.3. Coordination with ICPDR

The ICPDR was regularly consulted and informed about project activities. The status of the Project, current findings and preliminary conclusions were presented to the ICPDR particularly on the following meetings:

- Kick off meeting, 9 September 2005
- Expert Group on Emissions, Belgrade, September 29-30, 2005
- WFD and Agriculture, 25 –26 April 2006, Malinska, Croatia
- 1st Meeting of the ICPDR Pressures and Measures Expert Group, 27-28 April 2006, Malinska, Croatia
- 2nd Meeting of the ICPDR Pressures and Measures Expert Group, 25-26 September 2006, Linz, Austria.

The final results of the Project will be presented on the DRP final seminar in Bucharest 20-21 February 2007 and a workshop on nutrients planned to take place in April 2007.

3.3.4. Participation in workshops and meetings in Serbia

During the Project implementation the Project Team Leader (TL) and/or other Project Experts (Local Team Leader (LTL), Local Danube Regional Project Expert (LDRPE), Local Pilot Project Expert (LPPE)) participated in the following meetings and workshops:

- Serbia's Danube Cities- Commercial, Scientific and Cultural Potentials, 29 June 2006, Serbian Chamber of Commerce, Belgrade, Serbia

  Attendance of conference.

- 'Advance Poljoopskrba' Agriculture Machine Company and experimental farm 'Radmilovac, 14 July 2006, Serbia

  Participation in the presentation of the farm 'Radmilovac'.

  The farm 'Radmilovac' belongs to the Faculty of Agriculture and serves the experimental implementation of new techniques, technologies and species. Participation in the presentation of the farm was a good opportunity to establish direct contact to possible machine supplier for the pilot farms and to some media representatives for agricultural issues. Also, a direct contact and first dialogue about cooperation between DRP and the Faculty was made with the dean of the Faculty of Agriculture.

- 'Danube Day' organised by Ministry of International Economic Relations, 28 July 2006, Belgrade, Serbia

Presentation of the Project and meeting with representatives of the Ministry regarding initiatives of the Project for new agricultural projects especially related to improvement of the environmental performance of Serbian agriculture.

- Swedish Integrated Milk and Dairy Development Project 'Milky River' in NIS, farmers' group in Lalinac village, first visit 1 August 2006, second visit 1 September 2006, Serbia

  Four pilot farmers, the LTL and LDRPE visited the head office of 'Milky River' and the farmers' group. Both project teams presented their own projects in general and shared experiences. The farmers' group has successfully organized a machinery ring for its members. The chief and the members of the farmers' group presented their experiences about organizing and working with their own machinery ring.

- Danube Serbia Project, 24 August 2006, Belgrade, Serbia

  Two representatives of the Danube Serbia Project were visiting the Project. The Danube Serbia Project is an EU funded project managed by the European Agency for Reconstruction. The main goal is to identify priorities related to investments and new jobs in the Danube region in Serbia. Currently some working groups collect information on the socio-economic situation, tourism, ports and inland water transport, agriculture, investment and environment. Presentation of the Project and the Project experiences with the current situation in Serbia regarding pollution from agriculture.

- REC workshop, 5-7 September 2006, Niska Banja, Serbia

  The workshop was a part of the activities of the UNDP/GEF Danube Regional Project – Output 3.4 'Raise access to information and public participation in the decision making process related to environment'. The main goal of the workshop was to present and to analyze all topics related to information about water quality, pollution and accidents. The participants were from government institutions and NGOs.

- 2nd Expert Group Meeting of the Danube Serbia Project, 14 September 2006, Belgrade, Serbia

  The Project has in August been visited by representatives of the Danube Serbia Project in order to collect information on the current situation in Serbia regarding pollution from agriculture. All Danube Serbia Project working groups presented their data after their field investigations.

- ESRI Users Conference, 15 September 2006, Belgrade, Serbia

  ESRI is a GIS (geographic information system) software and technology package. The possibilities and results of the ESRI technology were presented including recommendations for its use for GIS-driven fertilizing.

- IV Regional Fair on agro-biodiversity, 21-22 September 2006, Dimitrovgrad, Serbia

  Presentation of the Project and the BAP brochure for farmers. One member of the pilot farmers participated also in the presentation.

4. EXPERIENCES FROM IMPLEMENTATION OF THE PILOT PROJECT BAPS

The cooperation with the pilot farms was based on an agreement that was signed by the farms in spring 2006. An example of such an agreement is seen here, structured according to the BAP's:

Dear Alkeksandar Moldovan

Based on your interest for cooperation with the project and our preliminary investigations for the possibilities on your farm we have the following, concrete proposal for cooperation:

1. We have already collected data for calculation of nutrient balances for 2005 concerning N and P. You will get the results around 1 March.
2. We will come and sample all fields and ensure the samples are analysed, hopefully before 1 March and in any case as soon as the frost is off the soils. Probably staff of Zrenjanin Agricultural Institute will assist us with this.
3. We will prepare field and fertiliser plans for your farm as soon as we have the results of the soil analyses, hopefully around 1 March. Data for calculations will be collected when we come for soil sampling.
4. We will ensure that your dairy cows are transferred to milk recording under Zrenjanin Agricultural Institute latest 1 May. Preparation of feeding plans and monthly feeding lists on basis of milk recording will start from September 2006.
5. We have not found any problems with spill of water from cleaning of stables, and
6. neither any problems with spill from watering of livestock
7. The livestock density on your farm is well below the indicative level of 170 kg nitrogen in livestock manure ex storage per ha - see the tables below.
8. The necessary storage capacity for livestock manure at your farm is shown below:

	Aleksandar Moldovan
No. of livestock	
Dairy cows	19
Heifers	7
Calves	2
Amounts	
Ha	55
Ton livestock manure	336
Kg N	1725
Kg P	323
Kg K	1848
Harmony	
Tonnes per ha	6.1
N per ha	31
P per ha	6

K per ha	34
Value of manure	
N value, €/kg	0.65
P value, €/kg	1.30
Value of manure with 80% field effect, €	1,258
Do, din	103,148
Necessary storage	
Necessary 6 months storage capacity, kbm.	168
Present storage capacity, kbm.	-
Necessary size of stores (+10%) and converted from ton to cubic metre	204
Price of manure store	
Type of manure store	Squared separation store with 2 metre walls
Diametre/side-length	10
Kbm concrete	1,5
Kbm reinforced concrete	28
Kbm sand	18
Price normal concrete, din/kbm	6,300
price, reinforced concrete, din/kbm.	7,100
Price of sand, din/kbm	1,000
Price of materials for storage, din	228,536
Possible subsidies	114,268
Project cost, €	**1,394**
Farmers own contribution, including own works	
Price of equipment	
Solid manure spreader	Use existing
Liquid manure spreader and pump	Cooperate with Kandic + Dragish
Slurry mixer	Not necessary
Total, din	-
Possible subsidies	-
Project cost, €	**-**
Farmers own contribution, including own works	**-**

It is a condition for financial support from the project that you take the necessary steps to apply for subsidies for the manure stores.

9. The manure store shall be built in a way that will lead to minimum dilution of the manure with rain water. It is a requirement that you participate in a seminar on design and construction of manure stores that will be held on Friday 24 February.
10. We anticipate that you after the building of the manure store will ensure not to spread manure in the period from 15 October till 1 March, and in any case not on to frozen land or land with a slope of more than 7°.
11. Proper technology should be used for spreading of livestock manure. Liquid manure and slurry should be spread with band laying system or be injected into the soil. We suggest that you continue to use your solid manure spreader. It is for the spreading of the liquid manure a condition for our cooperation that you form an agreement on use of liquid manure spreader and pump with Kandic and Dragish, and that you take part in an excursion to visit other farmers, who cooperate on ownership and use of farm machinery.
12. We remind that livestock manure should be incorporated into the soil within 6 hours in case it is not spread onto land with growing plants.

13. We will organise a seminar in May concerning planning of plant protection on your farm, and further ensure that the indicative plan is followed up with visits from advisers 2/3 times in the growing season for adjustment of the plan to the situation.
14. We offer a test of your field sprayer in May.
15. We will during the project period find a solution for a locked store for pesticides.

The cooperation we offer is in general given on the condition that

- You agree to cover your part of the costs of the interventions as stipulated above. The project gives a financial support in the following way: Presented and official invoices for purchase of eligible and agreed services, equipment or building materials are reimbursed with the costs exclusive of VAT. The VAT part shall appear from the invoice. Payment is done by the project co-ordinator within 2 weeks after presentation and approval of the invoices.
- The project reserves the right to change the proposed cooperation in case Kandic and Dragish refuse to cooperate with the project.
- You perform any requested registrations about farm operations, here under registrations of purchased or used inputs in the production, sale of farm products, dates of specific operations, etc.
- allow the organising of open days on the farm and the use of data on the calculated or estimated economic and environmental effect of the implemented BAPs on the farm

In case you violate cooperation or if it is terminated after wish from your side, then you are obliged to pay back the financial support already given by the project.

Please confirm by your signature on the below statement that you agree to the above.

Best regards,

Slobodan Milosevich

To Slobodan Milosevich

Concerning BAP interventions on my farm

I agree to the proposed cooperation in your letter of 10 February. I have the following comments:

Best regards,

Aleksandar Moldovan

The agreement, which rather should be understood as a letter of intent with the purpose to have a joint understanding of the cooperation between the farmers and the Project, was signed with 8 pilot farms after a process of identifying and selection of farms.

However, the agreement between the pilot farms and the Project was not fulfilled for all points: farm advisers connected to Zrenjanin Agricultural Institute did not as anticipated and agreed with the leader of the Institute, Dr. Predrag Popov, involve themselves in the Project (for more details about this see chapter 11: "Cooperation with the extension service"), and the farmers' application for subsidies to co-finance necessary investments failed. The Project fulfilled the part of the agreement between the pilot farms and the Project that was not depending on the subsidized investments and the involvement of local farm advisers, as explained in the following.

4.1. Resource economy for nitrogen and phosphorus

4.1.1. Status/results

The results of nitrogen balance calculations as shown in the following Figure 4.1 are quite interesting, but also expected: the N-balance of the pilot farms is increasing with increasing number of livestock units per ha.

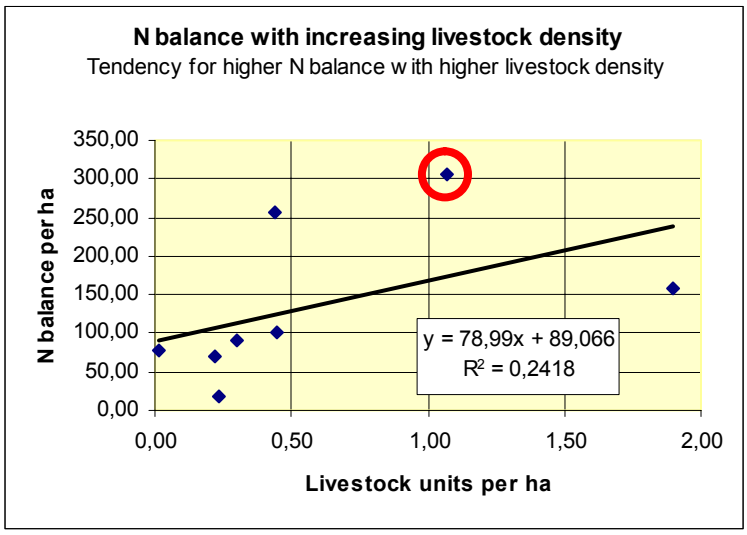


Figure 4.1: Nitrogen balances on pilot farms and their correlation with the livestock density

The correlation between nitrogen balance and livestock density is not significant in this case with only 8 farms, but from Danish analyses of much more farms we know that this correlation exists, and it also seems to be natural with this correlation as it is the livestock manure that causes the leaching of nitrogen.

Figure 4.1 is also in line with the impressions we have received about the practices exercised on the farms in relation to the defined BAPs:

- The farm with the red ring around the dot is the farm for which the examples of the nutrient balance calculations are shown below. It appears from the calculations, that the farm buys an equivalent of 218 kg pure nitrogen in mineral fertiliser per ha. This is even for a farm without livestock a very high input of mineral fertilisers. The fertilising effect of the livestock manure his herd produces would be sufficient to cover more than half of the normal norms, but the problem for this farm is that it completely lacks manure storage facilities and that is apparently also is in lack of equipment for spreading of manure on the fields.

- The farm with the lowest balance is very economical concerning purchase of mineral fertiliser, and the farmer does not use supplement protein feed for his herd. The balance is so low (and for the stables even negative) so that he can probably not continue for many years with such a low balance without negative effects on the crop yields and the milk yields.

- The farm with the second highest balance is a pork and egg production farm, which according own explanation sometimes just dumps the slurry in the nature in the wintertime because of lack of manure storage capacity. The farm is furthermore using commercial feed as the main feed for the herd of pigs and hens. The balance in the stable for this farm is the highest for all farms – 355 kg nitrogen per livestock unit.

The results / printouts of the nutrient balance calculations were distributed to the farmers at a seminar on 10 April 2006.

The next two pages show examples of the nutrient balance calculations from one of the farms (Figures 4.2 and 4.3).

Nutrient accounts

Harvest 2005

Radovan Padejski

Mihajla Pupina 28
Perlez

107. LU
100 ha cultivated
1.07 LU per ha

Stable balance

	Items	kg N	kg P	kg K	kg Mg	kg S	kg Cu
1	Feed and straw	9450	2672	1993			
2	On-farm produced feed and straw *						
3	Grass for grazing and grass for stable feedin						
4	Livestock						
5	Ammonia for straw						
6	**Total input to the farm**	**9450**	**2672**	**1993**			
7	Livestock	173	47	13			
8	Milk	1462	290	464			
9	Eggs						
10	Farmyard manure (ex storage)						
11	Farmyard manure produced during grazing	6702	1153	5310			
12	**Removal from the farm in total**	**1635**	**337**	**477**			
13	Change in herd	662	181	51			
14	**Total change in stock on the farm**	**662**	**181**	**51**			
15	**Nutrient surplus in the stable**	**7153**	**2154**	**1465**			
16	**Nutrient surplus in the stable per LU**	**67**	**20**	**14**			
17	**Nutrient surplus in % of application**	**70.7**	**75.5**	**71.7**			

* On-farm grown feed and straw produced in the previous period

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Figure 4.2: Printout from the nutrient balance calculation program, showing the stable balance for one of the pilot farms.

Field balance

	Items	kg N	kg P	kg K	kg Mg	kg S	kg Cu
1	Mineral fertilizer	21861					
2	Organic fertilizer (purchase)						
3	Farmyard manure (applied)	6702	1153	5310			
4	Farmyard manure produced during grazing						
5	Seed	32	6	7			
6	Nitrogen fixating						
7	Deposition	1500					
8	**Total input to the field**	**30095**	**1159**	**5317**			
9	Crops (sale)						
10	On-farm produced feed and straw						
11	Grass for grazing and grass for stable feedin						
12	**Removal from the field in total**						
13	**Nutrient surplus in the field**	**30095**	**1159**	**5317**			
14	**Nutrient surplus in the field per ha**	**301**	**12**	**53**			
15	**Nutrient surplus in % of application**	**100**	**100**	**100**			

Field balance + stable balance

16	**Nutrient surplus stable + field**	**37248**	**3313**	**6782**			
17	**Nutrient surplus stable + field per ha**	**372**	**33**	**68**			
18	**Nutrient surplus in % of application**	**92.6**	**82.6**	**92.1**			

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Figure 4.3: Printout from the nutrient balance calculation program, showing the field balance as well as the total balance for one of the pilot farms.

The N-balance of the farm presented above as an example shows that the farm 'produces' a surplus of 37 248 kg N/farm or 372 kg N/ha in one year.

The farm with a red circle around in Figure 4.1 is a clear illustration of the seriousness of the balance and the importance for the farm economy as well as for the environment:

- The farm has 100 ha and will therefore leach ca. 30 tonnes pure nitrogen into the environment annually.
- Comparing the leaching with EU's definition of sound drinking water quality, namely maximally 50 mg NO^{3-} per litre, the leaching is equal to pollution of a tremendous amount of water up to this safety level.
- Given that the price of nitrogen (in mineral fertiliser) is around 0.7 € per kilo the leaching represents a value of € 21,000, which each year flush out of the farms economy.

It has to be noted, however, that it is with agricultural activity, even for farms without livestock, not possible to get down to a balance of zero. However, the line in Figure 4.1 indicates that this farm is far above the performance of its colleagues, and that some measures must be taken to improve the situation.

Analyses from Denmark show less variation among farms due to the introduction of agro-environmental measures already 30 years ago.

Data for the calculation of nutrient balances were collected during initial visits to the pilot farms, using a specially elaborated form. The data was processed with a computer program which was made available by DAAS, and adopted with necessary norms for N and P content of crops and products, etc.

4.2. Crop production systems

Crop production systems are dealt with in the Pilot Project BAPs and are addressed by points no. 2 (soil analyses), 3 (field and fertiliser planning) and 7 (livestock density) in the agreement between the pilot farms and the Project above.

4.2.1. Status/results

The following activities were performed:

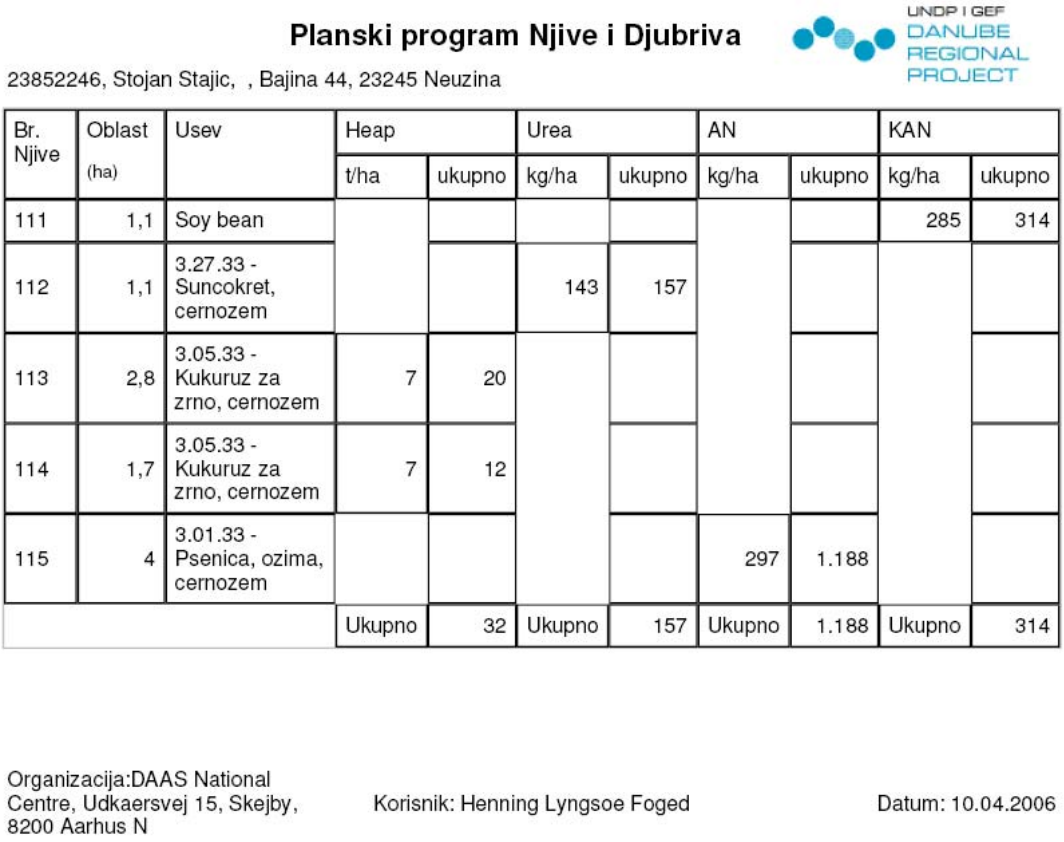
Table 4.1: Activities related with crop production systems

	Ha in total	Soil analysing 29 May 2006, ha	Field and fertiliser planning for 2006 (delivered 10 April 2006), ha	Field and fertiliser planning for 2007 (delivered 4 September 2006), ha
Stojan Stajic	18	10.7	10,7	10,7
Dragan Dzenopoljac	100	45.8	45,8	45,8
Istvan Gligor	18	8.2	8,2	5,4
Dusko Curcin	11	-	-	-
Dragisa Boric	200	28 fields, but no data about sizes of fields	-	-
Rajka Kandic	40	-	19,6	-
Radova Padejski	30	-	12,77	-
Aleksandar Moldovan	55	-	31,09	-
TOTAL	472	64.7 + 28 fields	128,16	61,90

The fertiliser plans we made have a quite simple printout with clear provisions of the needed fertiliser use per ha, per field and for the entire farm (see Figure 4.4). The normative basis used was gathered from among others Ukraine, and can be seen on the project homepage.

Field and fertiliser plans are made with an Internet based computer program which DAAS made available for the Project, and which was translated and customised with fertiliser norms and adopted manure standards, as well as with details of available commercial fertilisers in Serbia, etc. The program can be accesses from the project homepage.

The results / printouts of some preliminary field and fertiliser plans were distributed to the pilot farms at a seminar on 10 April 2006.



Planski program Njive i Djubriva

UNDP I GEF DANUBE REGIONAL PROJECT

23852246, Stojan Stajic, , Bajina 44, 23245 Neuzina

Br. Njive	Oblast (ha)	Usev	Heap		Urea		AN		KAN	
			t/ha	ukupno	kg/ha	ukupno	kg/ha	ukupno	kg/ha	ukupno
111	1,1	Soy bean							285	314
112	1,1	3.27.33 - Suncokret, cernozem			143	157				
113	2,8	3.05.33 - Kukuruz za zrno, cernozem	7	20						
114	1,7	3.05.33 - Kukuruz za zrno, cernozem	7	12						
115	4	3.01.33 - Psenica, ozima, cernozem					297	1.188		
			Ukupno	32	Ukupno	157	Ukupno	1.188	Ukupno	314

Organizacija:DAAS National Centre, Udkaersvej 15, Skejby, 8200 Aarhus N

Korisnik: Henning Lyngsoe Foged

Datum: 10.04.2006

Figure 4.4: Printout from the field and fertiliser planning program, showing the field and fertiliser plan for one of the pilot farms with 5 fields.

4.3. Livestock production systems

Livestock production systems are dealt with in the BAPs and are addressed in point no. 4 (milk recording and feeding planning) in the agreement between the pilot farms and the Project above.

4.3.1. Status/results

Based on the lack of performance and interest from the Zrenjanin Agricultural Institute we concluded that it would not give any meaning to work with the transfer of the milk recording to the Institute.

We decided in stead to develop some standard feeding plans for dairy cows (see an example printout printout in Figure 4.5). The planned seminar about optimized feeding of cattle and pigs took place on 16 August 2006.

Feeding plans for pigs and cattle were developed with excel based programs. They were translated to Serbian and customized with Serbian feeds etc. The programs can be downloaded from the project homepage.

PLAN ISHRANE

Standard feeding plan 2

JH	Kg mleko (ECM)	471 Kukuruz, svež						424 Trava, početak cvetanja	109 Mešana hraniva	289 Suženi repin rezanac	920 Stočna kreda	922 Mono kalcium fosfat (MKF)
JH 5,5								5,5				10
9,0	7,5	1,0						8,0				10
10,2	10,0	1,0						9,2				10
11,4	12,5	1,0						10,4				10
12,6	15,0	1,0						11,6				10
13,8	17,5	1,0						12,8				10
15,0	20,0	1,0						14,0				10
16,2	22,5	1,0						15,2				10
17,4	25,0	1,0						16,4				10
18,5	27,5	1,0						16,1		1,4		10
19,7	30,0	1,0						14,6	0,3	3,8		10
20,9	32,5	1,0						13,1	3,3	3,6		10
19,1	mlađa telad strategija	1,0						10,5	3,6	4,0		10
20,5	starija, strategija	1,0						11,8	3,3	4,4		10

Standard feeding plan 2

KG	Kg mleko (ECM)	471 Kukuruz, svež						424 Trava, početak cvetanja	109 Mešana hraniva	289 Suženi repin rezanac	920 Stočna kreda	922 Mono kalcium fosfat (MKF)
JH 5,5								30,6				10
9,0	7,5	5,6						44,4				10
10,2	10,0	5,6						51,1				10
11,4	12,5	5,6						57,8				10
12,6	15,0	5,6						64,4				10
13,8	17,5	5,6						71,1				10
15,0	20,0	5,6						77,8				10
16,2	22,5	5,6						84,4				10
17,4	25,0	5,6						91,1				10
18,5	27,5	5,6						89,4		1,5		10
19,7	30,0	5,6						81,1	0,3	4,1		10
20,9	32,5	5,6						72,8	3,3	3,8		10
19,1	mlađa telad strategija	5,6						58,3	3,6	4,3		10
20,5	starija, strategija	5,6						65,6	3,3	4,7		10

Komentari

Figure 4.5: Printout from the cattle feeding planning program, showing a feeding plan for dairy cows based on grass (code 424), fresh maize crop (code 471), grain (code 109) and sunflower cake (code 289), balanced with minerals (code 922).

The milk recording is at present not seen as a management tool for the farmers (for feeding purposes, and for controlling the payment from the dairy) but only as a way in which the milk laboratory can pump some subsidies out of the state budget.

4.4. Livestock density

Livestock density is related with point 7 in the above agreement between the pilot farms and the Project.

4.4.1. Status/results

We calculated in connection with the nutrient balance calculations also the livestock density.

The livestock density was above 1.7 Animal Units/ha on 2 of the farms, but actually the picture is so unclear that it is impossible to say anything precisely, because:

- It seemed like the pilot farms in general did not spread the livestock manure uniform on the fields but gave priority to owned fields and fields close to the stables.
- The farms with too high livestock density had some rented land which was not included in the number of ha they informed us about.

4.5. Livestock manure management

The livestock manure management addresses the following points in the above agreement between the pilot farms and the Project:

- 5 – spill of water from cleaning
- 6 – spill of water from watering of livestock
- 8 – establishing of manure stores
- 9 – dilution of livestock manure with rain water
- 10 – periods for spreading of livestock manure
- 11 – use of proper technology for handling of livestock manure
- 12 – incorporation of the livestock manure into the soil.

4.5.1. Status/results

It was during the initial visits to the farms clarified, that only one farm had a heavy dilution of the livestock manure with water from dripping drinking nipples and from cleaning of stables etc. This was a big pig farm which, typically for such farms established in the communist time, had a production system with flushing of the slurry channels by use of water, in which way the dry matter content of the slurry dropped to 1-2 % compared to the normal dry matter content of 4-6 %. It is extremely expensive to

store such diluted liquid manure and to transport it to the fields for use as fertiliser. Change of the production system would more or less require total renovation of the stables. The farm was excluded from being pilot farm due to this and also due to the fact that it was in the process of changing ownership, which would make it difficult for us to make an agreement with the farm.

We did not find any possibilities to reduce the dilution of the manure with rain water, simply because there were (almost) no manure stores at the pilot farms, which is of course a pre-requisite for this assumption.

All farms agreed to avoid spreading manure in the wintertime if they would have the necessary livestock manure storage capacity established.

All farms agreed in principle to incorporate livestock manure into the soil within 6 hours from spreading.

Major issues were dealing with storage facilities and equipment for handling of livestock manure:

- All the pilot farms failed, despite their signature on the above agreement between the pilot farms and the Project, to apply to the Ministry of Agriculture, Forestry and Water Management for subsidies in April for storages and equipment. The agreement between the pilot farms and the Project was based on the estimation of the material costs (direct costs) for storages and equipment, which the subsidies and the Project would cover fully, while the farmers had to agree to cover the work themselves. This seemed a fair agreement, also considering the economic benefits the farmers would get from a better manure management.
- A seminar on manure storage facilities and manure handling equipment was convened for all the pilot farms in Belgrade on 24 February 2006.
- A representative of the Danish manure handling equipment supplier Samson (http://www.samson-agro.dk/) visited Serbia during the summer.
- 6 of the farmers signed later applications to the Voivodina Region for subsidies, which now were based on the total price including works. These applications were prepared by the Project. The Voivodina region did not approve the applications – the call was of some political reasons simply cancelled by end of 2006.
- Finally, given the situation, it was decided to build one manure storage for one of the pilot farmers, who seemed most interested and offered to co-finance the project. This farm has around 20 dairy cows.
- The Project developed a design for a special separation manure storage for the pilot farms corresponding to the situation at the pilot farms and in Serbia in general, where the manure typically is produced as a mix of solid and liquid manure in the stables, where straw is used for bedding, where there are no drains in the stables, and where the manure is taken out from the stables as a mix of solid and liquid manure. Five of the farms had the full plans developed for establishing the separation manure storage (see one of the plans in Figure 5.1 in chapter 5: Building of manure pad"), while we developed a plan for two of the pig farms, based on cooperation about a slurry tank. The plans were developed through a sub-contract with a Serbian architect, certified for agricultural buildings. The separation manure store is cheaper than conventional stores – one store for the solid manure and a tank for the liquid part – and the conventional stores can not be used in the given situation because the two fractions have to be separated in the store.
- Even the largest of the pilot farms is too small to make cost-efficient investments into livestock manure handling equipment. We proposed therefore to the farms that they could cooperate in different ways about ownership and use of manure handling equipment, whether new

equipment to be purchased with subsidies and support from the Project, or equipment that already exists on the farms that could be taken over by the cooperation. A standard template for a cooperation agreement was elaborated on basis of DAAS experience with cooperations in Denmark. The Project also organized a visit to another part of Serbia, where a farmer cooperative was established in connection with another project. However, Serbian farmers need some time to get acquainted to the idea of cooperation with colleagues and to understand the benefits of this, and we did not succeed in this matter within the short project period.

4.6. Use of chemicals for plant protection

The subject deals with points 13, 14 and 15 in the agreement between the pilot farms and the Project above.

4.6.1. Status/results

The Project convened a seminar about plant protection at Zrenjanin Agricultural Institute on 11 April 2006, where focus was on the following subjects:

- Effect of advice and efficient working equipment
- Possibilities for use of reduced doses
- Personal protection – both theoretically and practical, as personal protection equipment was demonstrated and handed over to the Institute.
- Test of sprayers – both theoretical and practical, as it was demonstrated how a field sprayer is tested. Test equipment was afterwards handed over to the Institute.
- General information about available pesticides on the market was presented by Serbian advisers.

Unfortunately the Institute did not as expected and agreed visit the pilot farms in the growing season for giving concrete advice on spraying of farmers' fields according to the climate, pest attack, etc., and they did therefore also not test the pilot farmers' field sprayers.

The Project provided pesticide safety cabinets for 5 of the farms who were interested in that.

4.7. Problems encountered

The results of the nutrient balance calculations are probably not precise because they among others are based on manure standards and standards for feedstuff, which we due to lack of official standards had to construct ourselves.

It is seen from Table 4.1 that -despite all this was offered for free- less than one quarter of the fields were sampled, and that field and fertiliser plans were elaborated for less than one third of the area the farmers say they have. The reasons for this are:

- Soil sampling of areas with winter crops did not give any sense in the spring.

- The extension officers from Zrenjanin Agricultural Institute did not take part in the sampling.
- Farmers are not interested to fertilise leased fields anyway.

The quality of commercial fertilisers is doubtful and farmers can often not get the fertiliser types that suit their needs (there are only a few types of mineral fertilisers on the market). It therefore seems out of proportion for the farmers to deal with soil sampling and fertiliser planning

There are in general no problems with the livestock density in Serbia – the main problem is making farmers understand the fertilising effect of livestock manure and to make the necessary investments to make it possible to use the livestock manure correct.

Problems with livestock manure storages and equipment for handling of livestock manure are that:

- They require heavy investments, which especially for existing stables seem difficult to finance, while investments can be avoided or reduced in connection with establishing of new stables, at least for BAPs 5 and 6.
- While in principle the investments in manure storage facilities and manure handling equipment would give incomes and savings for the farmers that correspond to half of the investments as a rule of thumb, the farmers have difficulty to finance the investments because
    1. the financial market is unfavourable in Serbia (no long term credits, high interest rates, security for the credits, etc.) and
    2. farmers are of good reasons -as long as the agro-environmental legislation is very limited and the limited legislation not even enforced- more interested to use available subsidies for income generating investments.

It is especially for the manure handling equipment, but due to the location of the farms gathered in villages also for the manure storage facilities, relevant for the farmers to cooperate about the investments. There is a very big economy of scale in manure stores. Efficient manure handling equipment is so expensive and is only used a few days per year for the individual farm. To share manure handling equipment, however, it is necessary that the farmers are willing to cooperate and have confidence to each other.

We anticipated that we with the project funding in combination with possibilities for the farms to apply for subsidies would not have problems with financing of the planned investments, but the reality showed something else – see chapter 9: “Cooperation with Pilot Project farmers”.

As for the manure handling equipment and manure stores it would be of great benefit if the farmers would make a cooperation agreement to share the equipment. A normal farm with a size as the average pilot farm can not utilize a field sprayer efficiently and it is not rational that 8 farms shall invest in and maintain the equipment and have the necessary knowledge about spraying if they could share one sprayer and if one of the farmers could specialize in performing the spraying for all of them.

4.8. Lessons learned

The results of the nutrient balance calculations are not surprising for the consultant, but pilot farmers and Serbian farm advisers showed big interest and surprise in the results, and have evidently never before thought about resource economy. The topic needs and deserves more attention.

It looks immediately strange that farmers are not so interested in free soil sampling and fertiliser planning. Apparently they do not understand these measures as necessary for farm management or that these measures have direct relation to their production economy, and more awareness needs to be created on this issue.

We also learned, unfortunately as expected, that Serbia neither has fertiliser norms or manure standards – such recommendations are apparently considered as private owned knowledge and kept close by professors and alike to the disfavour of the producers. A surprise for us was to experience that Serbia does not have uniform standards for classification of soils – meaning that results of soil analyses depends on the laboratory the sample is sent to. This lack of a comparable standard severely hampers the possibility to make a fertiliser plan, and is also a pre-requisite for the preparation of fertiliser norms.

The Zrenjanin Agricultural Institute does not see any interest in building up a capacity to assist farmers with feeding planning – and also not in all the other things discussed above and below. The institute works as extension services, dealing with what the state wants it to deal with in the states' interest. It is underpaid and therefore needing extra payment for anything that comes beyond the work given it together with its state funding, and completely without any business interest in prosperous advisory activities it can assist farmers with. The Zrenjanin Agricultural Institute does not even have connection to the Internet and the few computers we saw there were modern in early 90ies.

Overall we can conclude that the 15 BAPs are as relevant as we considered when formulating them.

It is important to encourage farmers cooperation, development of the financial markets, to earmark 50% subsidies for agro-environmental investments and to supplement the subsidies with state guarantees for the rest financing.

The field sprayers we have seen were in a terrible condition. The one we tested in connection with a seminar on plant protection at Zrenjanin Agricultural Institute on 11 April 2006 showed variations in the nozzle yield of around 30%, some nozzles were dripping in stead of spraying, the boomer was not in order, etc.

Farmers and advisers are helplessly working with plant protection in an environment dominated by the pesticide producers. There are for instance to our information no field tests carried out in Serbia that could form the basis for the advisers' and farmers' choice of pesticides and determination of doses.

4.9. Recommendations

The experiences with the implementation of the Pilot Project (which the Project considers to be of Danube Basin wide relevance) are that

- ***The defined 15 BAPs are relevant and important for all Pilot Project farms and we do not see any reason to adjust them.***
- ***The problems and bottlenecks identified made us formulate a number of project ideas, because the spreading of the BAPs require substantial attention and financing. It is clear that the main priorities of authorities, governments and farmers for the moment deals with other issues than agro-environment, which we have to realise, and it is therefore necessary that the international community and international donors supports the implementation of the BAPs.***
- ***Awareness-raising is needed concerning livestock recording and feeding.***

- ***A farm advisory service should be established in Serbia.***
- ***Enforcement of the feed legislation so that the feed producers and dealers label the feed correctly with information about the energy content.***

4.10. The relevance of the Project BAPs for ICPDR's Joint Action Plan

According to the ICPDR homepage the Joint Action Plan (JAP) of the ICPDR outlines the specific steps that were agreed to be taken over the period 2001-2005 to achieve the environmental objectives outlined in the Danube River Protection Convention including many large-scale measures to reduce water pollution, to promote nature conservation, to restore ecosystems, and to safeguard the long-term sustainable management of the environment. The implementation of the JAP will direct the Danube countries' governments to meet their commitments to make a positive difference to the aquatic environment along the Danube and its tributaries. (http://www.icpdr.org/icpdr-pages/jap.htm)

The Joint Action Plan focuses as far as agriculture is concerned on point discharges from agriculture incl. agro-industry.

The Project recommends to include investments in manure storages and equipment for bringing out manure in the Joint Action Plan.

4.11. The relevance of the BAPs for the WFD Programme of Measures

The administrative unit of the Water Framework Directive (Directive 2000/60/EC) is a functional unit of surface or ground water: the water body. The overall environmental objective of the Water Framework Directive is to achieve "good water status" throughout the EU by 2010 and for it to be maintained thereafter (some possibilities for derogation from this principle are defined in the Water Framework Directive and require substantial argumentation). The Water Framework Directive requires that significant pressures have to be identified.

A significant pressure means any pressure that on its own, or in combination with other pressures, may lead to a failure to achieve the specified objective (good water status). If agricultural point sources or diffuse sources are identified as significant pressures, all water bodies in risk of not achieving good status due to the impact of this pressure alone or this pressure in combination with other pressures have to be identified. The risk assessment has to be confirmed by actual monitoring of the water bodies. If the monitoring confirms the risk, agricultural practices have to be changed in a way that makes it possible for the water body to achieve good status. A programme of measures, has to be established in order to achieve the objectives for the water bodies.

The Water Framework Directive has an "ecosystem approach". Its programme of measures reflects the vulnerability of each water body. E.g. for lakes with a high percentage of intensive agriculture in their catchment other measures addressing agriculture in addition to the BAPs included in the Pilot Project can be required to reach good status.

The programme of measures shall also take into account other Community legislation for the protection of water including the Nitrates Directive and the IPPC Directive.

The present Project addresses nitrogen, phosphorous and pesticides. These polluting substances create the biggest problems in groundwater bodies and surface standing water bodies (lakes, reservoirs and coastal waters).

An example of how the pollution problems could be handled in line with the WFD is given below for the Black Sea proper and/or coastal water bodies near the Danube delta:

1. Definition of good status as ecological quality ratios for biological quality elements (based on the water body type) as defined in the WFD.
2. Translate biological quality elements defining good status into a maximum load of nitrogen, phosphorous and dangerous substances, incl. pesticides (expert judgement, supplemented by mathematical models).
3. Compare the present load with the maximum load allowed for good status and calculate the percentage reduction needed.
4. Split the present load into sources (e.g. urban waste water, industry with separate outlets, agriculture, nature/background load) – source apportionment.
5. Set up different scenarios on a reduction of the present load to the maximum load that allows good status.
6. Evaluate the different scenarios in technical and economic terms and choose one scenario for implementation (programme of measures).

The BAPs defined under this Project, the evaluation of their impact, proposals on how to implement them and the economic evaluation provide input to points 4, 5 and 6.

5. BUILDING OF MANURE PAD

Change of the farmers' perception of livestock manure from regarding it as waste to valuable resource is crucial. Two issues have to be addressed:

1. How to build manure pads and storages for liquid manure and get it financed.
2. Effective farm advisory service to help the farmers in optimising the use of nutrients (incl. livestock manure) on the farms.

This section provides practical experience on the first issue from one practical example. The Project considers the general approach and the practical experiences to be of Danube Basin wide relevance.

5.1. Background

The construction of a livestock manure facility is very expensive for the farmers in Serbia and it is rarely a priority. This is the reason why it can be only built with the help of the state (or donors), through financial support for agricultural development. Consequently, the aim of the Project was first to convince the farmers about the advantages of a manure storage facility and later on to support them in seeking financial support. The farmers were explained in a very detailed way why they should make the manure pad and in what way the Project can help in doing that.

All the farmers involved in the Pilot Project had a problem with storing solid and liquid manure. None of the five cattle farms had manure pads but stored the livestock manure on a pile in the yard. The three pig farms did not have enough capacity for storing liquid manure. During the Project one of these farms bought another farm and built a new pig stable including a tank with enough capacity for the manure from both farms and thus solved the problem by transporting the liquid manure to the new tank.

Farmers were suggested by the Project to solve their problems by building a manure pad with a capacity to store six months' manure production. The Project financed the construction plans for the manure pads for each of the cattle farms, while for the two remaining pig farms the Project proposed a joint underground liquid manure tank. The financing of all these objects would come from three sources: the Project, the farmers and the state through financial support.

All the farmers accepted the suggestion and agreed on a 10% participation with own funds. When the main construction plans were finished, one of the pig farmers withdrew from the joint work. This rendered the liquid manure tank too big and expensive for only one farmer and a decision was therefore reached to cancel the construction. Instead of the underground tank it was decided to direct the funds of the Project to purchasing a sophisticated, squared, above ground slurry tank with a band laying system. The above ground tank would be used by two farms.

5.2. Application for all farmers to MAFWM and the Vojvodina Provincial Secretariat

On the initiative of the Project and helped by the Project's technical support the farmers prepared the necessary documentation for applying at the Provincial Secretariat for Agriculture in Vojvodina for financial support in the field of rural development in May 2006 (see also chapter 3.2.1). The result of the contest was postponed a few times and finally, the contest was cancelled without explanation from the Provincial Secretariat for Agriculture. For more details see chapter 10.2: " Provincial Secretariat for Agriculture in Voivodina".

5.3. Agreement with one of the Pilot Project farmers

The cooperation with the pilot farms was based on two agreements that were signed by the farms in spring 2006.

An example of the first agreement is seen here:

1.The Parties to the agreement are UNDP/GEF Danube Regional Project, represented by local team Leader Slobodan Milosevic (further in the text The Project) and the farm owner Aleksandar Moldovan (further in the text The Farmer)

2. This agreement is valid from the day of signing until the end of the Project 31.1.2007 with a possible extension until 30.6.2007.

3. The Farmer says that he is already applying Best Agricultural Practices on his farm (mark in the list in column 1)

4. The Farmer agrees to apply on his/her farm in cooperation with the Project the listed Best Agricultural Practices (mark in the list column 2).

The cooperation is in general given on the condition that

- **Farmer agrees to cover his part of the costs of the interventions as stipulated above. The Project gives a financial support in the following way: presented and official invoices for purchase of eligible and agreed services, equipment or building materials are reimbursed with the costs exclusive of VAT. The VAT part shall appear from the invoice. Payment is done by the project co-ordinator within 2 weeks after presentation and approval of the invoices.**

- **The Project reserves the right to cancel the cooperation in certain Best Agricultural Practices in case the budget of the Project for applying Best Agricultural Practices has been already allocated. In such case the agreement must be revised.**

- **Farmer performs any requested registrations about farm operations, hereunder registrations of purchased or used inputs in the production, sale of farm products, dates of specific operations, etc.**

- **Farmer allows the organising of open days on the farm and the use of data on the calculated or estimated economic and environmental effect of the implemented BAPs on the farm.**

In case the farmer violates cooperation or if it is terminated after wish from farmer's side,

then farmer is obliged to pay back the financial support already given by the Project.

Based on this agreement the second agreement (individual contract) with the individual farmers was signed. For an example see chapter 4: "Experiences from implementation of the Pilot Project BAPs". The construction of a manure pad on one of the pilot farms was based on these agreements.

5.4. Procedure for building one manure pad

Because of the failure of the state to provide money and the short remaining period until the end of the Project, the project team decided to allocate its limited funds to one manure pad for cattle manure and an agreement was made with one of the Pilot Project farmers to build the pad on his farm.

Design

The starting point for design was: there is a need to store manure produced by 40 cows for 6 months. According to Danish standards that corresponds to 160 m^3 of storing space. Because of increased consumption of straw in the stables, the capacity was finally increased to 180 m^3.

The technical design was made by an authorized architect, specialized on farm objects and with long-term experience in designing and constructing manure pads. The technical design was approved by the International Pilot Project Expert (for more details see chapter 5.5: "Design").

Agreement with the farmer

Based on the data and documentation that had been prepared for applying for financial support at the Provincial Secretariat for Agriculture, the farmer gave his written statement about his financial participation in the construction of the manure pad.

Agreement with Construction Company

Based on the technical data from the technical design for the manure pad, a contract with the construction company which should execute the construction was concluded including specific conditions regarding time for finishing the construction, quality control by the architect, payment and other conditions.

Agreement with Supervisor

The Project concluded a contract with the expert who will in the name of the Project make the supervision of the construction of the manure pad (the same authorized architect who has made the drawing). In accordance with the main technical design, the construction steps were also defined. The supervisor checks the construction status in accordance with these construction steps and, if he finds the construction acceptable, approves the finished object in the end.

Building process

After the signing of the contract by the farmer, the construction company and the supervisor, the construction started.

5.5. Design

The design of the livestock manure storage was made especially for the pilot farms, justified by the following:

- The stables of the pilot farms, except for the pig stables with slotted floors and slurry production, are all with solid floors without (or with insufficient) drains for the urine and other liquids.
- This way to build stables is not specific for the Voivodina region, but is unfortunately found many places in the former communist area.
- The liquid part of the livestock manure constitutes around half of the amount of the manure, half of the nitrogen and a big share of the phosphorus.
- If the liquid part is not separated via drains in the stables it will therefore be removed from the stables in a mixture with the solid fraction of the livestock manure.
- When placed outside, the liquid part will relatively quickly, depending on the soil type, disappear into the ground (see picture 7.1 in chapter 7: "Estimation of the impact of the 15 Pilot Project BAPs" where some of the liquid is visible besides the solid part).
- Conventional storage of manure for such production systems would normally happen in an open store for the solid part and a storage tank with a lit for the liquid part, connected to the stable as well as the storage for the solid part via drains and pipes.
- Establishing of conventional manure stores would require total renovation of the floors of the livestock stables in order to equip them with drains. This was not considered feasible.
- Another aspect is that the distribution on the fields would be troublesome with a mixture of solid and liquid manure; much of the liquid part would be spilled underway to the field unless special (and expensive) water tight wagons are used; the mixture of solid and liquid manure is very heterogenic and is difficult to load or to spread evenly on the fields; and the mixture cannot easily be homogenised due to the content of bedding material.
- The building of separate liquid and solid manure stores is very expensive – especially the liquid store is expensive due to the lit that is necessary to avoid evaporation of nitrogen.
- The Danish Agricultural Advisory Service has developed many officially approved standards for designs of manure storages, including one separation manure storage. However, this separation manure storage would anyway require that also a liquid manure storage tank is built.
- The challenge was on this background to find a design for a special separation livestock manure storage, in which the liquid fraction is collected as soon as it separates, and where the solid and the liquid store is integrated into one unit.

A cross cut of the actual design of one of the manure separation stores designed for the Pilot Project farms is seen in Figure 5.1. The certified Serbian architect has elaborated the drawings on basis of sketches form the International Pilot Project Expert and ensured they follow the Serbian legislation. Three amendments of the drawings were made before we found the optimum compromise between Danish know-how on design and construction of manure storages and the legal requirements etc. in Serbia.

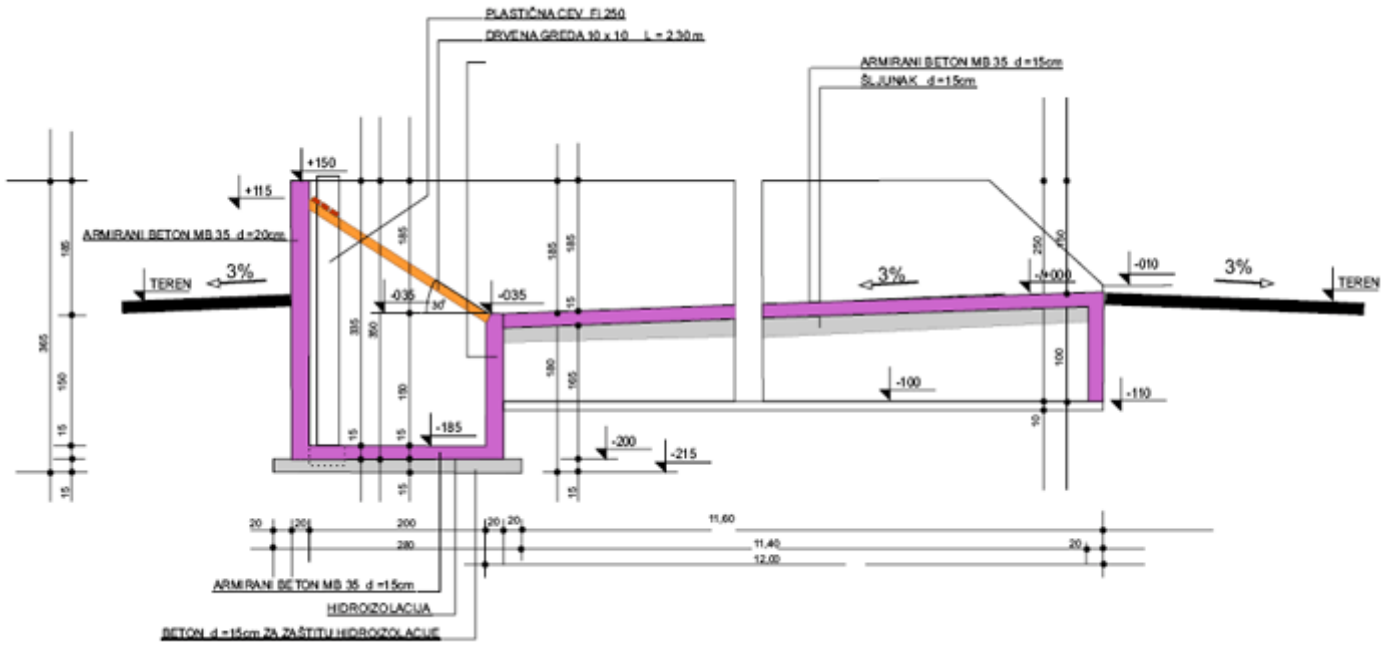


Figure 5.1: Separation manure store, designed by the Project, in which a mix of solid and liquid manure coming from the stables will separate into a liquid and a solid fraction.

A full set of drawings and calculations adapted to the individual conditions of each of the five Pilot Project farms interested in a separation manure store was developed, while the two large pig farms had drawings developed for a joint, above ground squared slurry tank. One of the pilot farms was in a situation which made the planning of manure storages illusionary for the present.

The International Pilot Project Expert emphasized that the design always shall be shown with the user instructions given in the left column of the following table. Some further remarks are added in the right column of the table:

Instruction for use that must be given to the farmer and always exposed together with the drawing	**Comment**
For safety reasons the used wooden construction as grating for separation of liquid and solid manure must be impregnated and changed whenever needed - a better alternative is to use concrete slats.	**Wood logs or other material for a wooden construction are affordable and available for most farmers, but wood will not be so durable as concrete slats, and it can therefore be a potential danger that animals or children who go into the store, or people that work in the manure store, could fall down into the liquid store if the wood logs are worn out. Falling down into the liquid store would potentially mean the dead because the liquid manure is very poisonous.**
If wood is used for the grating then hinder	**This instruction is given with reference to**

Instruction for use that must be given to the farmer and always exposed together with the drawing	Comment
access for children and animals by a 1.5 metre high fence around the manure pad, and place warning signs about danger of liquid manure.	**the above explanation. A fence of 1.5 metres height is similar to the legal safety requirements for open lagoons for liquid manure in Denmark.** **The fence has to be opened and closed every time manure is taken in or out of the manure store.**
Always fill the manure pad by placing manure on the grating first.	**The grating functions as a drain and at the same time it should hinder evaporation of nitrogen from the liquid store – the placing of solid manure on the grating hinders evaporation of nitrogen.**
Always empty for liquid manure before solid manure is removed in order to have a maximal separation effect.	**The separation manure store is designed in a way so that the liquid store does not constitute half of the storage space, but only around 25% of the space, while fully separated manure will be of equally sized fractions. Therefore the separation will partly happen during the emptying of the liquid store.** **However, the dimensions on the store can be changed to accommodate different relations between the liquid and the solid store.**
Never empty the liquid manure below the surface of the ground water as this will cause the concrete walls to crack - a pipe can be placed in the ground besides the storage in order to ease the detection of the ground water level.	
As a security measure no manure must be placed at the exit slope ramp (2 metre) in order to avoid leaching to the ground in case of a heavy rainfall or other situations.	

5.6. Price and financing

The overall price of the construction was according to the offer from the construction company 15.300,00 EUR (incl. VAT). Upon the signing of the contract with the construction company, and before

the start of the construction 30% of the total price was down paid. The rest is to be paid after the completion of the work and acceptance of the object. The farmer participates with 1.000,00 EUR.

5.7. Agreement with the farmer

The farmer gave to the Project the following statement on financing:

SUBJECT: Statement on providing the funds

I, Dzenopoljac Dragan, Personal Identification No. xxxxx, hereby state that I will provide personal participation in construction of the manure pad on my farm amounting to 1000,00 EUR (onethousandeuros). The stated amount I will down pay in cash to the Project Office of the Danube Regional Project in Belgrade after the start and before the completion of the works.

Date and Place:

Signature of the Farmer:

5.8. Agreement with construction company

The contract with the construction company was signed before the beginning of the work. The most important parts of the contract were:

- contracted deadline
- the obligations of the company to do all works with high quality
- the list of most important works (excavations of earth of the category III, transport of the surplus earth, purchase, spreading and stamping down layer of gravel, concreting the ground plate by MB35 reinforced concrete in double bedding; purchase, transport, preparation and setting the metal framework, building and setting the wooden sluice, purchase and setting PVC tubes)
- mandatory quality control and approval of consecutive construction steps by the supervisor of the construction (excavation of earth with spreading the gravel layer, setting the metal framework and wainscot, finished floor, finished walls).

The above issues were included as precondition in the terms of payment.

5.9. Agreement with supervisor (authorized architect)

The contract with the supervisor was signed before the start of construction. It was decided that he should make five visits to the building site as follows:

1. The first day of work to ensure right position of the pad and order of works.

2. The second is to be after excavation of earth and spreading and stamping down the gravel.

3. The third visit will be after moulding of the floor.

4. The fourth will be after setting up the reinforcement and the wainscots.

5. The fifth will be after finalisation of the building activities.

He will check building activities in relation to the drawing and in relation to good construction practices, prepare a short report to the project team for decision about approval before continuation, or pointing out things that must be put in order before continuation. He will prepare the final report after the building process.

5.10. Experiences from building process

Before the start of the construction it is necessary to point out an experienced and skilled person who will in the name of the Project do the supervision. In the present case this is the authorized architect who designed the manure pad. It is considered a good solution, because extra consultations between the manure pad designer and the supervisor are avoided, as well as misunderstandings and misinterpretations. The supervisor should visit the location before the start of works in order to clear all possible misunderstandings with the farmer and construction company and to secure that the pad is built in accordance with law requirements and wishes of the farmer.

The experience from the manure pad construction showed that the issues for the five visits of the supervisor should be slightly changed as follows:

The supervisor should visit the building site together with the project leader at least five times:

1. At the beginning of the works.
2. After excavation of earth and spreading and stamping down the gravel, and setting off the site with marker sticks and rope to indicate the elevation and slopes etc.
3. After moulding of floor in the liquid store part and during setting up the reinforcement and the wainscots here
4. After moulding of floors in the solid store part and setting up the reinforcement and the wainscots here
5. At finalisation / delivery.

During the visits the architect pointed out things that had to be put in order before continuation. Checks were made in relation to the drawing and in relation to good construction practices.

During the building process the construction company and the supervisor were able to mutually agree about solutions to all problems. It was for instance mutually agreed with the construction company and the farmer during the 2nd visit which happened on 14 December 2006 that:

- The option to pump liquid manure out via a plastic tube would be replaced with another solution that suited the farmer better, namely to make access with a hose from a vacuum tanker via an opening in the upper part of the liquid store.

- It was emphasized to the construction company that the iron grating for the reinforcement of the concrete must be covered by at least 2 cm concrete as manure is aggressive to concrete.

- It was decided to keep the grating between the solid and liquid stores, made up of impregnated wood that was used for the shuttering.

After finalisation of the construction of the manure pad the supervisor (authorized architect) prepared a supervision report as shown below:

R E P O R T

ABOUT SUPERVISION OF MANURE PAD CONSTRUCTION

Location: **Neuzina**

Address: **Djure Raskova Street, no. 58**

Cadastre Municipality: **Neuzina**

Cadastre Lot: **193**

INTRODUCTION

For storage of solid manure until carrying it away there has been built a reinforced waterproof concrete pad of a surface 120 m2 and a concrete tank for slurry of a volume 30 m⁷. The facility has been built in the backyard of investor Dragan Dzenopoljac.

LOCATION AND BASE CONDITIONS

The manure pad and slurry tank are placed in the backyard part of cadastre lot no.193, cadastre municipality of Neuzina. The facilities are functionally connected with cow stable. Dimensions of the manure pad are 12 x 10 = 120 m⁵, and dimensions of the slurry tank are 10 x 2 x 1.5 = 30 m⁷. The location where the capacities have been placed is flat. Geomechanical elaborate of resistance of location wear hasn't been made. During excavation, underground waters didn't appear.

FACILITY AND CONSTRUCTION DESCRIPTION

Reinforced concrete pad and slurry tank have been made monolithely. They were casted at the very place from reinforced waterproof concrete MB40. The manure pad was formed of a AB floor-plate d=15 cm. Because of poor location the thickness of gravel-layer was 30-40 cm (partially the ground was replaced by gravel). The manure pad has been fenced up with three sides by reinforces concrete walls 20 cm thick and 1.5 m tall. The walls were casted in bilateral wainscot of fir planks.

The tank for slurry is, in regard to plateau, 1.5 m dug in. The walls of the tank are of waterproof concrete MB40 and 20 cm thick.

Accepted reinforced construction has a high stiffness. It is practically insensible on settling, knowing type and characteristics of load. Taking into consideration that the manure and slurry are very aggressive a usage of waterproof concrete MB40 has been forecasted as well as use of cement resistant against sulfates, in accordance with regulations.

During construction of works there was a supervision of quantity of used materials and quality of works.

The beginning of works – 9.12.2006.

The ending of works – 26.12.2006.

DECEMBER 9, 2006. The beginning of works: contractor of the works has been familiar with the location. The position of the object on the field was determined and dimension of the mentioned object was marked on the field. The peak elevations of the plateau floor were defined in regard to the terrain and the depth of excavation in relation to the mentioned peak elevations. The contractor could start with earthings.

DECEMBER 12, 2006. It was found out that the earthings had been finished. Cutting of surface layer and excavation of the slurry tank had been finished in accordance with the project's dimensions.

Purchase, spreading and stamping of gravel under the floor plate have been finished. Because of poor location, the thickness of gravel layer was 30-40 cm instead of 15 cm, which was according to the project. Concreting of the floor plate of the slurry tank was made. The preparation of works, as well as setting up of wainscot of slurry tank walls had been made.

DECEMBER 17, 2006. The floor plate of the plateau and the walls of the slurry tank were concreted. The works on making wainscot of slurry tank walls and setting metal framework have begun.

The necessary metal framework for walls was provided and brought to the site. The agreement regarding position of hole for emptying the slurry tank was made with the contractor and investor. The position will be on a side wall because of easy access with existing farm machinery.

Some agreements were made with the contractor: to finish wainscot as soon as possible, to build in metal framework and to concrete all manure pad walls. Concrete will be ordered from a concrete factory for December 25, 2006.

DECEMBER 25, 2006. Inspection of construction site was made. The works on making wainscot of walls and setting metal framework had been finished. All preparatory works for concreting had been finished before concrete was ordered. Because of failure in a concrete factory, concreting of walls was postponed for December 26, 2006.

DECEMBER 30, 2006. Concreting of walls was finished on December 26, 2006. All contracted works were finished with this. Removing of wainscot was postponed a few days. The wainscot was left to protect concrete from expected bad weather conditions.

Belgrade, Arch. Stanislav Marinkov

January 2007.

6. APPLICABILITY AND RELEVANCE OF PILOT PROJECT BAPS FOR ALL LOWER DANUBE COUNTRIES

It is of course of interest whether the 15 BAPs that have been formulated and focused on in relation to the Pilot Project activities are applicable and relevant for all lower Danube countries.

The process of selecting and formulating the BAPs included:

- Determining the universe of BAPs: This is given by the reports of Phase 1 of the DRP project.
- Limiting to primary production: Some BAPs were not relevant for the Pilot Project farms, as the Pilot Project is related to practical farming and therefore with what the farmers have influence on. To work with policies about registration of pesticides, for instance, was not considered relevant for the Pilot Project.
- Conforming with EU policies: BAPs were formulated in a way so that they conform to EU's legislation, here under especially the Nitrates Directive (91/676/EEC) and the Pesticide Directive (91/414/EEC), and therefore also with the typical content of Codes of Good Agricultural Practices in EU member states and international standards for regulation of pesticide use.
- Limiting to universal BAPs: It was considering the size and duration of the Project found necessary to concentrate on the most essential BAPs, and due to the geographical coverage of the Project on those which are universal not only for the lower Danube countries, but in fact for the whole World. We have excluded issues that are not relevant for many of farms in the lower Danube countries, such as mountain farming, karst area farming, etc.
- Taking production systems in the lower Danube countries into consideration: The lower Danube countries are all former communist countries where the centralised systems had enforced the concentration of agricultural production at large state or collective farms (big farms), while the rural population normally had small plots of land and a few livestock for own consumption (plotters). These two farm types still exist, while a third category of private farms has emerged after the privatisation of the large state or collective farms: private farms decreased in size.

On basis of these categories of farms the BAPs are especially taking production systems in the lower Danube countries into consideration in the way that they

- set minimum thresholds of 5 ha and/or 5 Animal Units for BAPs no. 1-3 (general and crop production systems), because it would not make sense to introduce BAPs on small plots, make fertiliser plans for ½ ha, make a manure store for 5 m^3 livestock manure, etc. It is believed that the plotters are a category of farms that will be less and less abundant with the increasing economic development in the countries, and that the pollution of the environment with plant nutrients and pesticide residues mainly stems from large and concentrated livestock production and large crop production farms with high productivity based on extensive use of agrochemicals;
- include BAPs no. 5 and 6 (avoid dilution of manure with water), which especially are necessary to focus on with reference to the typical way to build stables in the communist time, designed in a way so that livestock manure had to be flushed out from the stables with massive amounts of water, and where drinking nipples or places typically were designed in a way that gives large amount of spilled water. Such production systems can

not form the basis for good manure management practices because it is difficult and expensive to store livestock manure and to use it as a fertiliser in these systems;

- suggest a required manure storage capacity of minimum 6 months (BAP no. 8), considering the climate region of the lower Danube countries, where crops do not grow in the winter time (BAP no. 10: no spreading of manure outside the growing season).

The following table lists up the Pilot Project BAPs and comments them in relation to whether they are universal or of specific relevance for the lower Danube countries and/or for production systems established in the communist time at large farms:

No.	BAP	Universal	Of specific relevance for Danube countries and/or for production systems established in the communist time at large farms
1	**There should on all farms above 5 ha and/or 5 animal units be calculated resource economy every year, latest 1 April for the preceding year, and covering at least the resource economy for N and P.**	✔	(✔)
2	**Every farm with at least 5 ha of arable crops should ensure soil sampling at least each 5 years.**	✔	(✔)
3	**Crop rotation and fertiliser plans should be prepared for all farms above 5 ha every year latest 31 March, for winter crops latest 1 August. Fertiliser plans shall be based on the expected yield level, the needs of the crops, and include both livestock manure and mineral fertiliser.**	✔	(✔)
4	**Livestock should be fed with rations that are correct balanced with energy, protein and minerals in relation to the productivity.**	✔	
5	**Cleaning of stables with water should be avoided or reduced to a minimum.**		✔
6	**Watering of the livestock should happen in a way that hinders spill of water.**		✔
7	**There should maximally be livestock corresponding to a nitrogen content in the manure of 170 kg N per ha. Manure should be sold to other farms or distributed to fields of other farms in case of a higher li9vestock density.**	✔	

No.	BAP	Universal	Of specific relevance for Danube countries and/or for production systems established in the communist time at large farms
8	**There should be storage capacity for at least 6 months production of livestock manure at the farm. Production systems with use of bedding material need storage capacity for both liquid and solid manure. Production systems with deep bedding can store the manure on the field for up to 6 months if the manure has a dry matter content of minimum 30%.**		✔
9	**It must be hindered that rain water can dilute the livestock manure.**	✔	
10	**Spreading of manure in the period from 15 October till 1 March should not take place, and in any case not on to frozen land or land with a slope of more than 7°.**		✔
11	**Proper technology should be used for spreading of livestock manure. Liquid manure and slurry should be spread with band laying system or be injected into the soil.**	✔	
12	**Livestock manure should be incorporated into the soil within 6 hours.**	✔	
13	**Spraying should be done according to the needs, and the doses take into consideration the spraying time, the development stage of the crop, the climatic conditions.**	✔	
14	**The spraying equipment should function properly, and it shall be ensured that the nozzles are functioning well to ensure an even spraying.**	✔	
15	**Plant Protection Products shall be kept in a locked store, where books are kept on the purchase and use of PPP.**	✔	

The situation on the Pilot Project farms has confirmed that the BAPs are relevant, and the BAPs were actually formulated simultaneously with the review of the situation at the pilot farms and the gathering of information for the nutrient balance calculations.

We realize that the BAPs defined for the Pilot Project activities are basic, and suggest that each country should use these BAPs as a basis for further and more comprehensive elaboration of Codes of Good Agricultural Practices with involvement of all relevant stakeholders in order to ensure local ownership to them.

7. ESTIMATION OF THE IMPACT OF THE 15 PILOT PROJECT BAPS

7.1. Summary

This section presents estimated environmental scenarios in relation to the implementation of Best Agricultural Practices (BAPs) in the lower Danube countries and at the 8 pilot farms.

7.1.1. Generally

- Based on visit to 8 farms included in the Pilot Project implemented in Vojvodina, Serbia, in 2006, 15 BAPs crucial for improvement of their environmental performance were defined.
- The implementation of the 15 BAPs defined is estimated to have a tremendous impact on the environment in the lower Danube countries and therefore on the quality of the waters in the Danube River and in the Black Sea if implemented in the whole of this part of the basin.
- The implementation would further save farmers for expenses to purchase pesticides and fertilisers, but would on the other hand require large investments in for instance manure storage facilities and manure handling equipment, as well as require availability of impartial advice on fertilisation and crop protection, improved legislation and enforcement of it, and resources for research, training and information.
- The estimates must be seen, however, in the light of the uncertainties and assumptions, and the quality of the statistical information available, on which they are based.

7.1.2. Manure management BAPs in the 7 lower Danube countries

- It can on the basis of the used methodology, assumptions and definitions be concluded that the introduction of the 12 BAPs dealing directly or indirectly with livestock manure management would save the environment for 557,000 tonnes of nitrogen and 90,000 tonnes of phosphorus. However, as the livestock production and productivities are expected to be normalised in the lower Danube countries after a period of transition, the effect would rather be 1.1 million tonnes of nitrogen and 163,000 tonnes of phosphorus:

Nitrogen and phosphorus loss to the environment, tonnes per year in the lower Danube countries	No - without implementation of BAP's	Yes – with implementation of BAP's
Now – with present livestock number, productivity and use of fertiliser	Now/No - Baseline scenario Nitrogen: 1,002,692 — Phosphorus: 150,555	Now/Yes Nitrogen: 445,641 — Phosphorus: 60,222
Normal – with normal number of livestock, productivity and use of fertiliser	Normal/No Nitrogen: 2,014,753 — Phosphorus: 272,287	Normal/Yes Nitrogen: 895,446 — Phosphorus: 108,905

557,000 tonnes N and 90,000 tonnes P

1.1 mill tonnes N and 150,000 tonnes P

Figure 7.1: Estimated leaching to the environment of plant nutrients N and P pr. year from the agriculture in the 7 lower Danube countries in 4 defined scenarios.

7.1.3. Pest management BAPs in the 7 lower Danube countries

> The environment and the food chain could be saved from 6,207 tonnes pesticides in the present situation (based on present consumption in year 2006), and 16,363 tonnes pesticides in a normal situation (based on an anticipated development in the general economy with the effect that the productivity and the pesticide consumption will normalise in year 2015). However, as statistics on pesticide consumption are only available for Romania and Serbia & Montenegro (and partly Croatia) these estimates relate to only 27% (31% with Croatia) of the agricultural area of the lower Danube countries. The possible impact on the entire agricultural area in the lower Danube countries, found by simple extrapolation, is the saving of the environment and the food chain from 22,800 tonnes pesticides with the present consumption and 52,000 tonnes in a situation with a normalised production in agriculture and a "normal" consumption of pesticides:

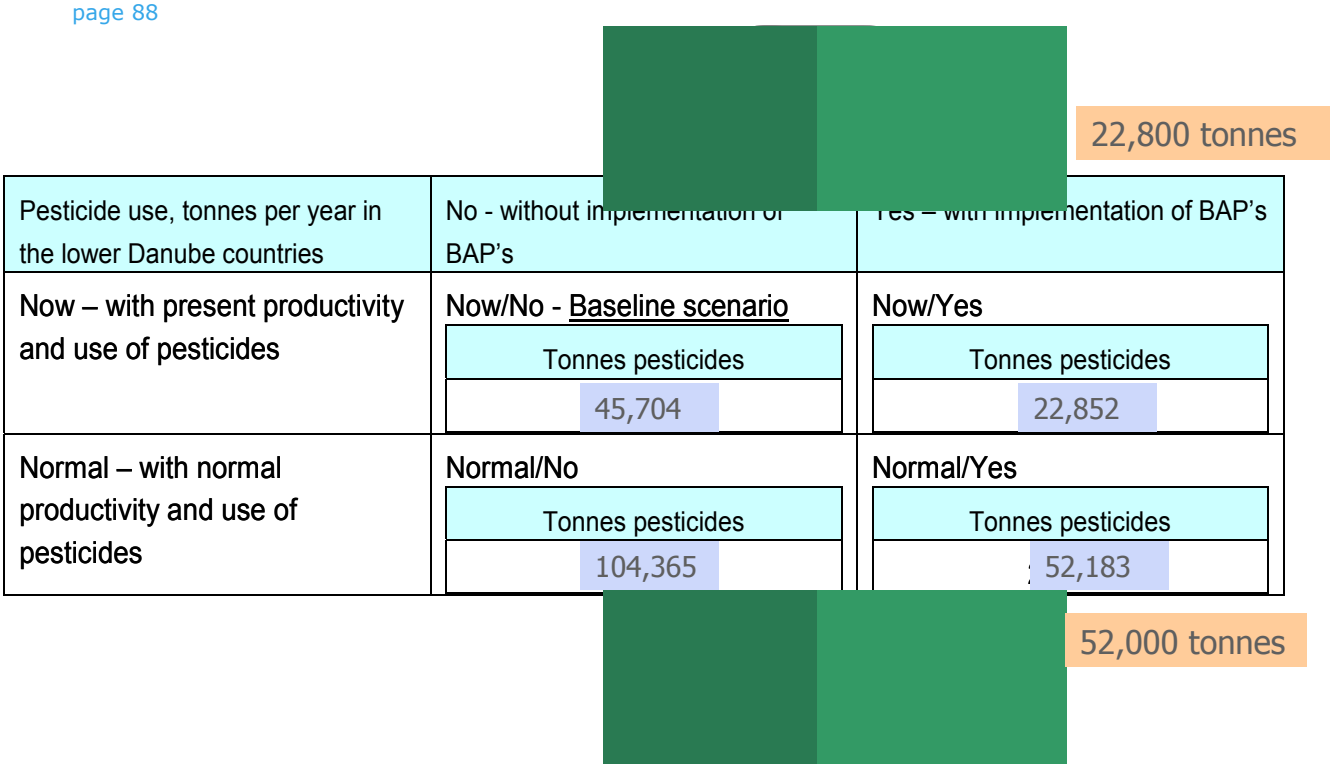


Figure 7.2: Estimated consumption of pesticides pr. year in the agriculture in the 7 lower Danube countries in 4 defined scenarios.

- The estimates concerning the impacts of BAPs concerning use of pesticides are based on extrapolation of a statistically weak based data set.
- The estimates concerning the possibility for use of reduced pesticide doses are furthermore based on Danish experience, where the climate and the cropping pattern is different from the lower Danube countries.

7.1.4. BAPs at 8 pilot farms in Serbia

The 8 pilot farms have in total 288 Animal Units[1], and grow 472 ha. It has been estimated, that they on this basis, using the same assumptions as for the entire lower Danube area, with implementation of the BAPs could save the environment for:

- 14,436 kg nitrogen per year
- 1,926 kg phosphorus per year
- 249 kg pesticides per year

3 of the farms have initiated a substantial increase of their livestock numbers, therefore the environmental impacts of the BAPs would be much increased in the future.

[1] 1 Animal Unit is defined as the number of livestock that produces 100 kg nitrogen in manure ex. storage pr. year.

7.2. Methods

7.2.1. Definition of scenarios

All lower Danube countries are geopolitical situated in various stages of transition from the former Soviet Union and Yugoslavian systems towards better situations. It is characteristic for transitional economies that the number of livestock as well as both the productivity in livestock and crop production with consumption of mineral fertilisers and pesticides is much reduced as compared to the "normal" situation. Example:

- The number of livestock in Ukraine is today only around one third of the situation in 1980ies before the collapse of the Soviet Union – the decrease is clearly due to the transition with cease or decrease of the livestock production at many former state and collective farms. Ukraine is as a result of the decreased livestock production much dependent on imports to comply with the domestic demands, most pronounced with respect to poultry meat. This is in sharp contrast to Ukraine's historical position as a large exporter of food commodities. Ukraine is in the process of restoring its agricultural production capacity, here under with foreign investments in the agricultural sector.

It is on this background in fact interesting to analyse the environmental effects of the BAPs in a situation with a normalised situation, with the "normal" level of livestock, which is roughly estimated as the situation before the economies changed (communist period), but with a productivity as can be expected to be reached within the next 10 years. This definition of a "normal" situation can be questioned. The concept of a "normal" situation is used to underline that as the economies in the 7 lower Danube countries are recovering from the present transition period, a substantial increase in the agricultural production and corresponding use of fertiliser and pesticides must be expected. The increase in the use of fertiliser and pesticides will depend on the efforts from the 7 states and their agricultural communities in optimising the use of manure and pesticides and minimising the loss of nutrients and pesticides to the environment.

It is of course also interesting to analyse the environmental effects of the BAPs in the present situation, meaning with the present number of livestock, productivity and use of input factors.

On basis of these considerations the following 4 scenarios have been defined – see Table 7.1.

Table 7.1: Scenarios defined for the evaluation of the environmental effects of the BAPs

Scenarios	No - without implementation of BAPs	Yes – with implementation of BAPs
Now – with present livestock number, productivity and use of pesticides and fertiliser	Now/No - Baseline scenario	Now/Yes
Normal – with normal number of livestock, productivity and use of pesticides and fertiliser	Normal/No	Normal/Yes

7.2.2. Methodologies used for the estimations

The 15 BAPs comprise 12 BAPs dealing directly or indirectly with livestock manure management, while the remaining 3 relate to plant protection. The methods applied for the estimation of the environmental effects are different for plant nutrients and pesticides.

The method for estimating the impact of BAPs on the environment is to assess the scenarios without and with implementation of BAPs, combined with assessing the situation now and in a normalised situation (see description of scenarios above).

The following table shows the methodological steps in the estimation of the environmental effects of the BAPs in the 4 defined scenarios.

Table 7.2: Methodological steps in the estimation of the environmental effects of the BAPs

Step No.	Steps – livestock manure	Steps – pesticide consumption
1	Clarification of the > number of major livestock types in the 7 lower Danube countries - cattle, chicken, pigs and sheep; and based on FAO's agricultural statistics - http://faostat.fao.org. The number of livestock in the present situation (the "Now" scenario – see definition of scenarios below) are found as the latest available data for the years 1985, 1990, 1995, 2000 and 2005, while the normal number of livestock (the "Normal" scenario) is found as the largest number in the mentioned years.	Clarification of the > consumption of major types of pesticides – herbicides, insecticides and fungicides & bactericides based on FAO's agricultural statistics - http://faostat.fao.org. The pesticide consumption in the present situation (the "Now" scenario – see definition of scenarios below) are found as the latest available data for the years 1985, 1990, 1995, 2000 and 2005, while the normal pesticide consumption (the "Normal" scenario) is found as the largest consumption in the mentioned years.
2	Identification of a relevant Manure Standard. We did not in any of the lower Danube countries find applicable manure standards (i.e. from which we have information about volume and content of N and P expressed ex. storage and defined for major livestock types, bedding types, housing systems and feed intensities. We adopted on this background, as the best alternative, a Manure Standard developed by Danish Agricultural Advisory Service and Danish Institute of Agricultural Sciences for Latvia in the years 1997 to 2001, where – to some extent – productivity levels, housing systems and bedding types have some similarities.	Qualified estimate of possible dose reduction with (scenario "Yes") and without (scenario "No") of the introduction of the 3 BAPs dealing with plant protection, based on Danish experiences since 1989. In this period the consumption of pesticides has dropped with 50% due to implementation of practices used in integrated pest control – see figures below. It is assumed that the farmers in the "Now" situation always use the dose recommended on the label.

Step No.	Steps – livestock manure	Steps – pesticide consumption
3	The amount of livestock manure produced as well as the content of plant nutrients (N, P and K) in the livestock manure ex. storage for the different types of livestock is determined on basis of the adopted Manure Standard and the found number of livestock for the "Now" and "Normal" scenarios	Quantification of the pesticide consumption for the scenarios "Now" (2005) and "Normal" (2015), combined with ("Yes") and without ("No") implementation of the 3 BAPs dealing with plant protection, based on the qualified estimates in Step 2.
4	Qualified estimate of the relative environmental effect, i.e. the field effect of N and P with (scenario "Yes") and without (scenario "No") of the introduction of the 12 BAPs dealing with manure management based on Danish experiences during the last 20 years since the introduction of the NPO plan (reduction of emission of N, P and organic matter into water) in 1986. In this period the consumption of mineral fertiliser has dropped with 40% and the crop yields has grown with around 30% due to increased field effect of livestock manure following improved livestock manure management practices and better agricultural practice in general.	
5	Quantification of the leaching of N and P from livestock manure per country for the scenarios "Now" (2005) and "Normal" (2015), combined with ("Yes") and without ("No") implementation of the 12 BAPs dealing with manure management, based on the qualified estimates in Step 4.	

The following Figures 7.3 and 7.4 illustrate the methodological steps in the estimation of the environmental effects of the BAPs.

Figure 7.3: Illustration of the methodology used for quantification of the estimated environmental effects of 12 BAPs related with livestock manure management

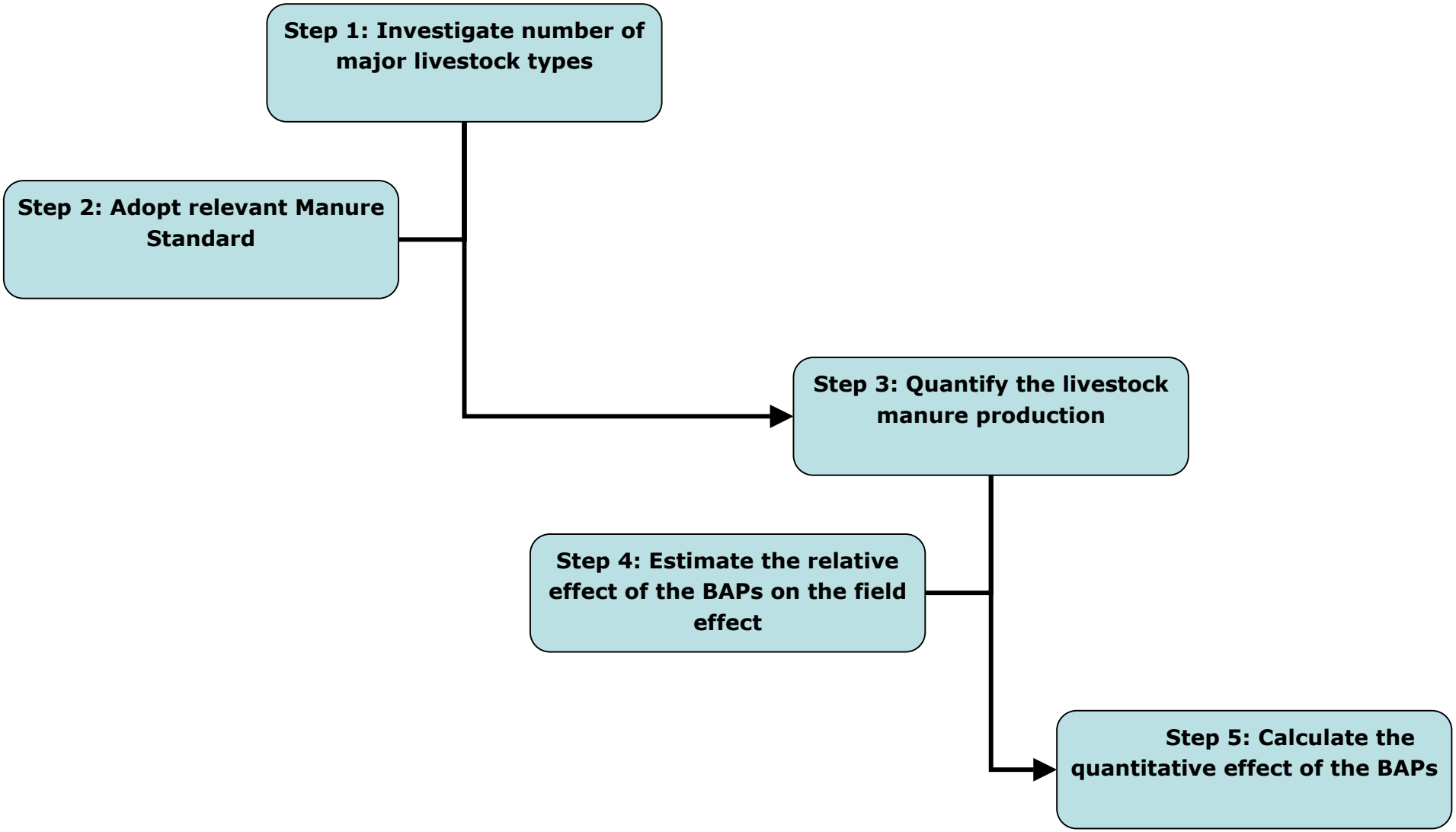
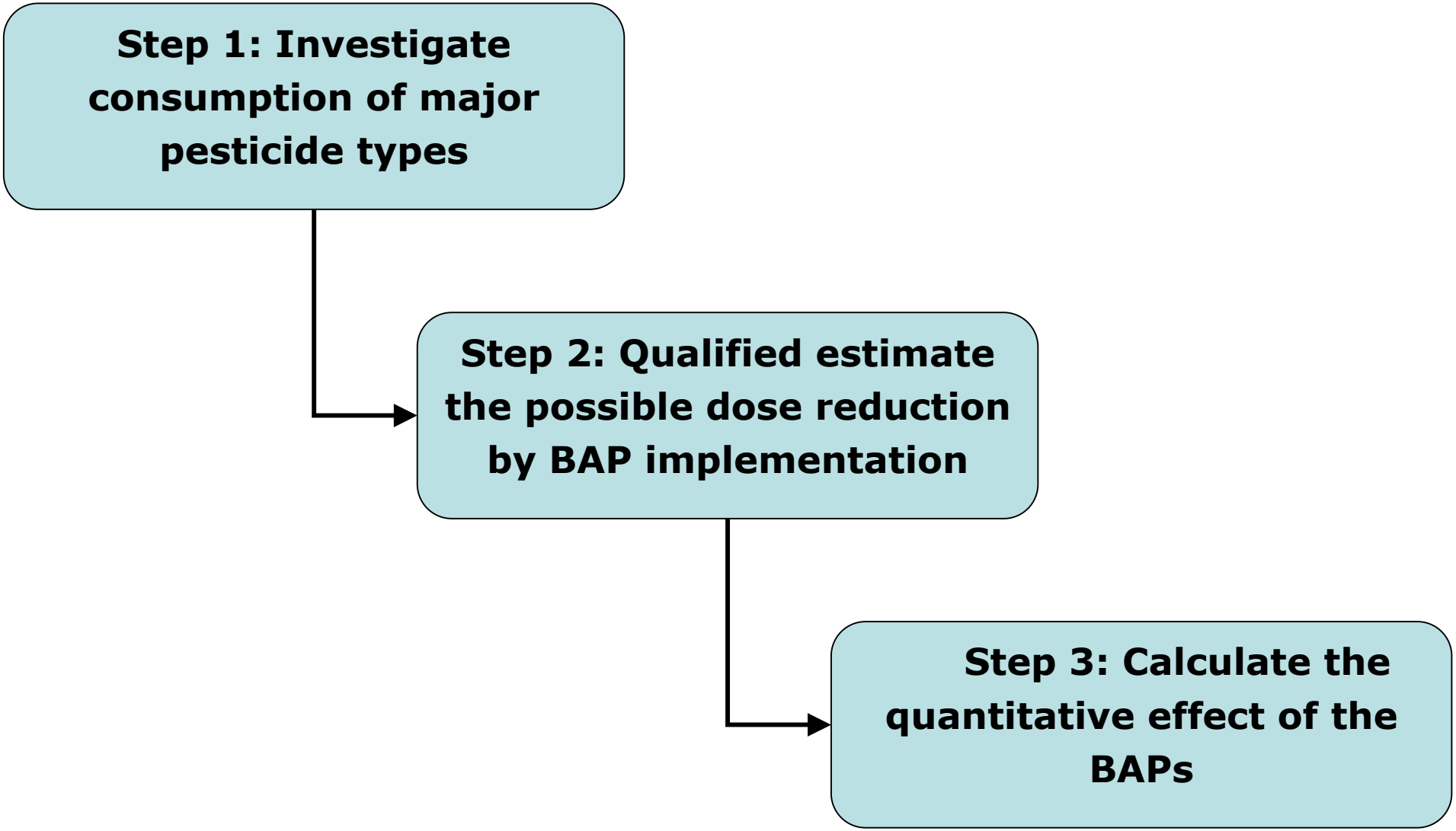


Figure 7.4: Illustration of the methodology used for quantification of the estimated environmental effects of 3 BAPs related with plant protection



Assumptions are listed up in the assumptions section below.

7.2.3. Definitions related to plant nutrients, nitrogen and phosphorus

Plant nutrients, here nitrogen and phosphorus, are normally appearing minerals in the biological turnover of the nature, but the turnover at farms are increased due to the increased stocking rate and/or plant production as compared to the situation in natural biotopes.

Major indicators of the impact on the nature of the farming activities are field effects of nitrogen and phosphorus in livestock manure as those minerals are potential detrimental for the quality of the environment, while at the same time being valuable and necessary input factors in the agricultural production. The field effect expresses the share of available plant nutrients that is taken up by the crop – this depends very much on the livestock manure management practices, and therefore on the number of livestock which determines the amount of livestock manure.

Definitions related to livestock manure

Field effect:	The amount of nitrogen in mineral fertiliser that can give the same yield as 100 kg of total-N in animal manure the first year after application, expressed in percent.
Animal Unit:	The number of livestock that produces 100 kg nitrogen in manure ex. storage pr. year. The definition is given in Danish legislation and used in other countries as well.
P Unit:	The number of livestock that produces 23 kg phosphorus in manure ex. storage.

The consumption of mineral fertiliser is relatively un-interesting as the farm practices and the costs of mineral fertilisers are warrants for close to optimal field effects in normal situations.

7.2.4. Pesticides

Pesticides are issues of a completely different character than plant nutrients; pesticides are foreign to the nature and they are not necessarily endangering the water environment, if they are degraded to harmless and naturally appearing compounds and elements in the nature. Pesticide residues could be accumulated in the food chain in other cases.

Atrazine is an example of a pesticide that is registered in the lower Danube countries, but which is banned in EU. Atrazine was banned in Denmark in 1996 after analyses showed the presence of atrazine and its derivates in around one third of ground water samples. Atrazine is accused of having harmful effects on foetus development. Its presence in ground water in Denmark is probably caused by extensive use of atrazin through many years of spraying against weeds along railroads.

Definitions related to pesticides

The danger of pesticides for the environment is evaluated on basis of different parameters. A good index, which quantify the leaching potential of a pesticides is developed and described by Gustafson (1989)[2]:

GUS: The Groundwater Ubiquity Score (GUS) has three classes for pesticide leachability. This index is simple and can effectively discriminate between pesticides that leach and pesticides that do not. GUS is a function of the pesticide characteristics Field half-life (DT50) and Organic Carbon sorption constant (Koc):

$GUS = \log_{10}(DT50) \times (4 - \log_{10}(Koc))$.

Pesticides detected in groundwater generally have GUS values exceeding 2.8, whereas compounds with GUS values below 1.8 were not detected in groundwater. We therefore define the limits of the transition interval within which the fuzzy subsets F (Favourable) and U (Unfavourable) are complementary by assigning complete membership to F if GUS < 1.8 and complete membership to U if GUS > 2.8.

http://www.pmac.net/benbfuz1.htm informs that atrazine has a GUS index of 3,56, while glyphosphate (Roundup) has a GUS index of -0.09.

The Danish Environmental Protection Agency has determined the safety level for drinking water as being under 0.1 microgram per litre of a single pesticide, while the sum of pesticides should be below 0.5 microgram per litre. The World Health Organisation (WHO) recommends less than 2 microgram of pesticide per loiter of drinking water.

The problem complex concerning use of pesticides comprises, as pointed out in reports of previous project stages, that there are registered pesticides in the lower Danube countries, that are not considered safe to use in EU, and therefore not allowed to use in EU, there are stores of previously allowed and now illegal pesticides, there are no waste collection systems established to handle empty packaging, ect. – all matters that we can consider as out of the reach of the farmer, but rather related with the quality of the legislation and not at least the enforcement of it. The BAPs that we consider in the Vojvodina Pilot Project deals with things that are important in relation to used farm practices, namely

- spraying according to needs rather than pre-programmed plans
- function of the field sprayers
- safe storage of pesticides.

Pesticides must be labelled and the information on the label includes a recommended dose. This dose is typically set so high that the producers are sure the pesticide has full effect under all climatic circumstances, and against all pests. Experience from Denmark shows, that spraying according to needs after principles used in Integrated Pest Management (IPM), can give full effect of pesticide doses that are down to 15-25% of the doses mentioned on the labels.

Use of full dose does not necessarily - like with plant nutrients - mean that the nature is polluted, as the pesticide could degrade without harming the environment, but it could in other cases be accumulated in the food chain and residues leach to water resources.

[2] Gustafson, D.I., 1989. Groundwater ubiquity score: a simple method for assessing pesticide leachability. Environmental Toxicology and Chemistry 8: 339-357.

7.3. Assumptions

The following tables present some major assumptions used in the estimation of the environmental effects of BAPs:

Table 7.3 a: Assumptions taken in the estimation of the "Normal" situation

Assumption No.	Assumption	Comment
1	The "Normal" number of livestock will stabilise in year 2015 as the maximum of the years 1985 to 2005	The assumption is conservative, as the food consumption generally goes up
2	The productivity of the dairy cows will increase from averagely 4,000 kg milk per year till averagely 6,000 kg milk per year from 1985-2005 till 2015	Today's dairy production per cow is rather around 9,000 kg milk per cow per year
3	The productivity of the sows will increase from averagely 15 produced piglets per year till averagely 20 piglets per year from 1985-2005 till 2015	Today's productivity in piglet production is rather 24 piglets per sow per year
4	The consumption of pesticides will in 2015 raise to the maximum of the years 1985 to 2005	Probably a conservative estimate as increased productivity demands higher use of plant protection means

Table 7.3 b: Assumptions taken in the estimation of the "Yes" situation

Assumption No.	Assumption	Comment
5	Field effect of nitrogen in livestock manure increase from 10% in the present situation (1985 to 2005) to 60% in 2015	The legally required field effect in Denmark is 75% The feasibility of the assumption is documented through • Figure 7.5 below showing the development of the consumption of mineral fertiliser in Denmark through the last 30 years • Figure 7.6 shows the development in Denmark in yield of winter wheat during the last 30 years • Figure 7.7 shows the development in field effect of nitrogen in

Assumption No.	Assumption	Comment
		Denmark through the last 20 years.
6	Field effect of phosphorus in livestock manure increase from 50% today (1985 to 2005) to 80% in 2015	The low effect today is due to the fact that much livestock manure is not used as fertiliser but just dumped in the nature
7	The consumption of pesticides will in 2015 raise to the maximum of the years 1985 to 2005	Probably a conservative estimate as increased productivity usually demands higher use of plant protection means
8	The pesticides could be used 2 times more efficient on basis of principles used in integrated pest management and well functioning field sprayers	The feasibility of the assumption is documented through • Figure 7 below showing the development of the consumption of pesticides in Denmark through the last 15 years • Figure 8 showing the effect of advice and equipment on pesticide residues in water

Picture 7.1: Considering that around half of the plant nutrients nitrogen (N) and phosphorus (P) are found in the liquid fraction, and that the conventional way of storing manure is like on the picture here, it seems justified to assume that the field effect can be increased with 50% through implementation of BAPs, which among others includes recommendations for building of manure stores.

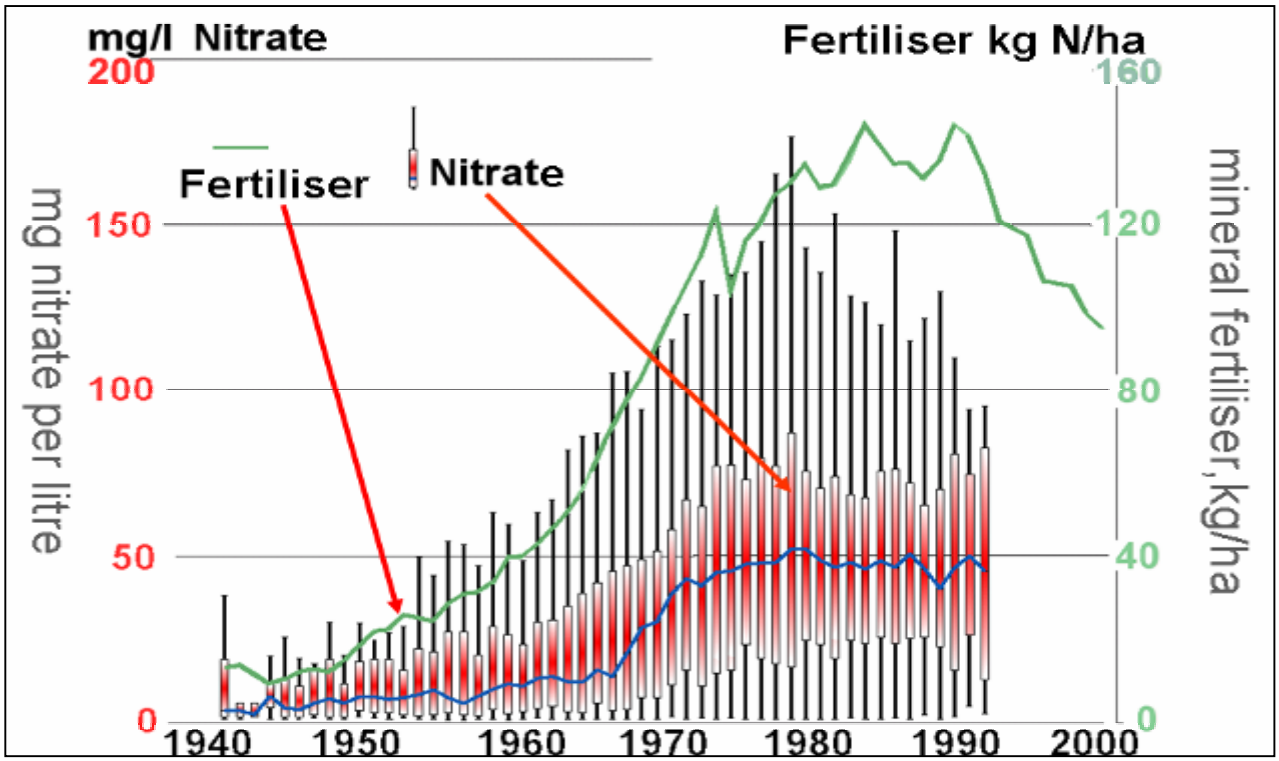


Figure 7.5: Development in consumption of mineral fertiliser in Denmark through the last 30 years. The production of livestock manure has been rather stable in this period, while the crops yields has gone up with around 30% as illustrated in Figure 7.6.

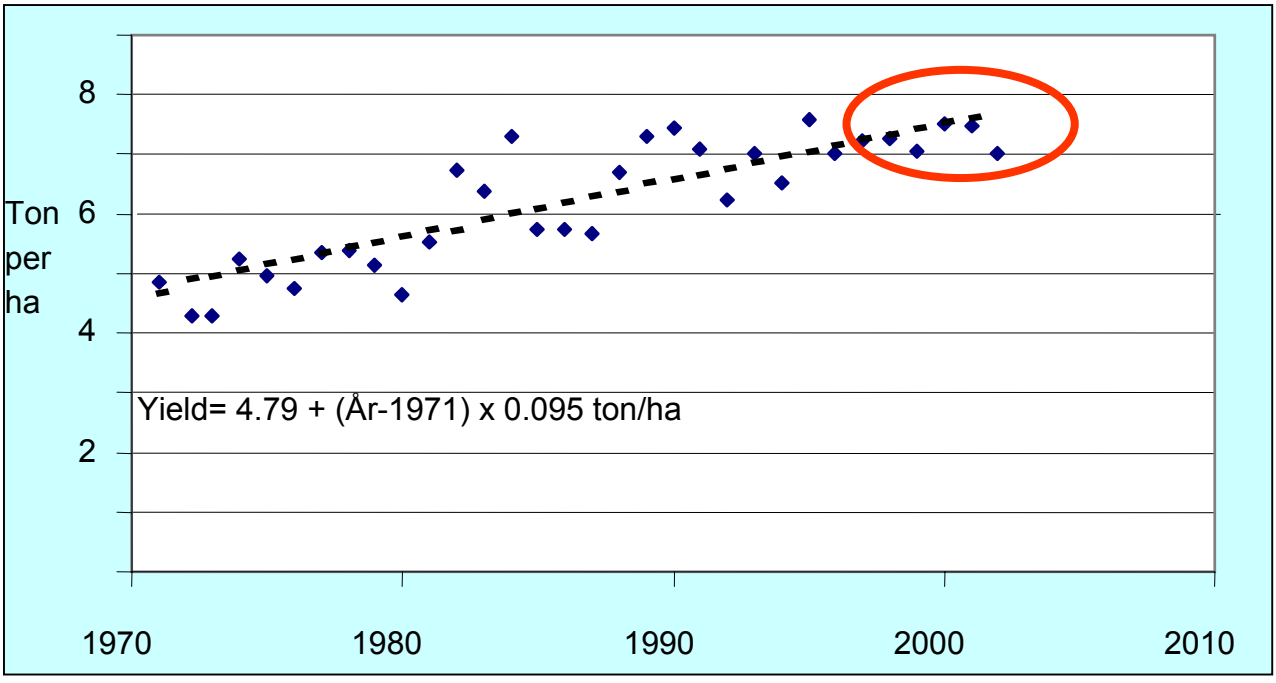


Figure 7.6: Development in Denmark in yield of winter wheat during the last 30 years. Other crops yields have followed the same trend.

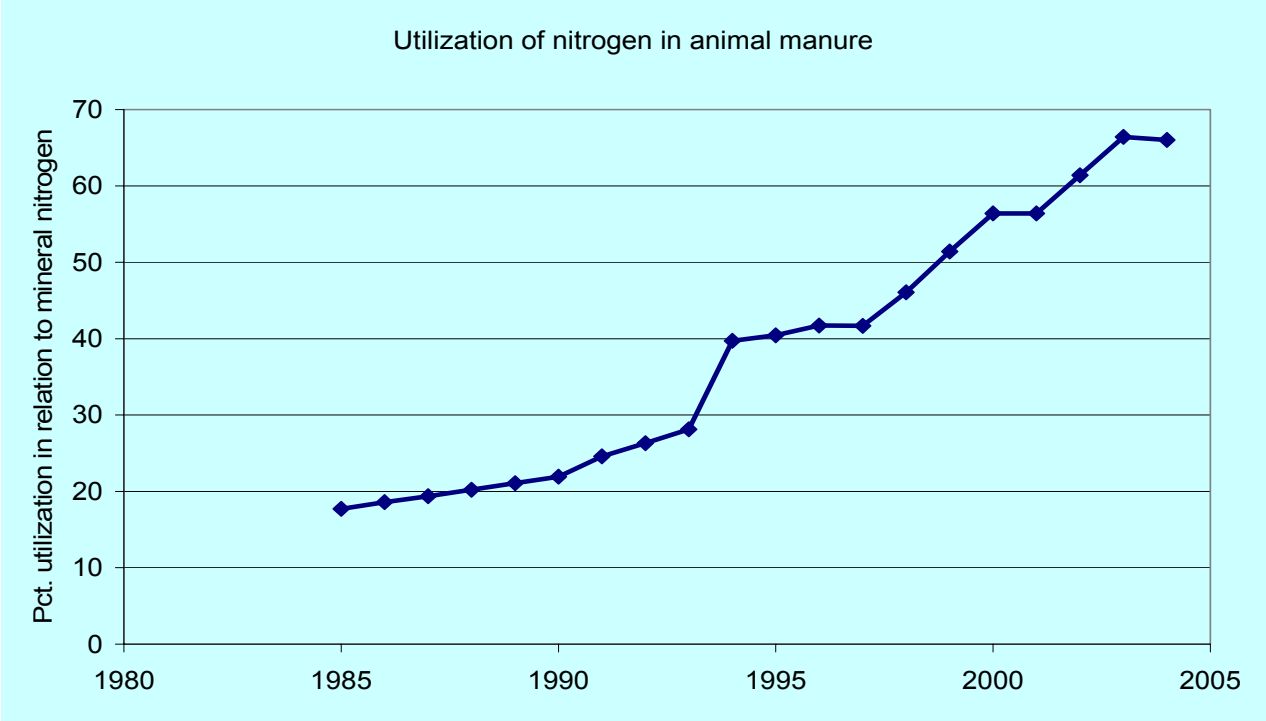


Figure 7.7: Development in Denmark in field effect of nitrogen during the last 20 years due to improved manure management practices.

It should be noticed, that the above mentioned assumptions concerning increase of field effect are based on the present practices compared to the attainable by full implementation of the BAPs. It is, however, emphasized that it can not always be assumed that what is not utilized by the crops would leach and runoff to the environment:

- Especially phosphorus would go into the pool in the soil if it is overdosed, and this pool is not readily leached but would be available for the succeeding crops. It is actually built into the field and fertiliser plan program that the balance one year would influence the norm for the coming year. The practice in Serbia is not that the fields are overdosed with phosphorus, actually there is a phosphorus deficiency in many fields, but rather that farmers simply dump the livestock manure directly in the nature, for instance slurry is pumped out into ditches in the wintertime.

- Nitrogen is very volatile, especially if the nitrogen is on the NO_3^-form as the largest part of the nitrogen in liquid livestock manure and mineral fertiliser. The store in the soil is especially of organically bound nitrogen, ammonia (NH_4^+) such as a big part of the nitrogen in solid manure, and solid livestock manure would therefore continue to release nitrogen up tol 3 years after spreading on the fields. Again, the current practices in Serbia make especially the nitrogen in the liquid manure disappear because the manure is placed directly on the soil.

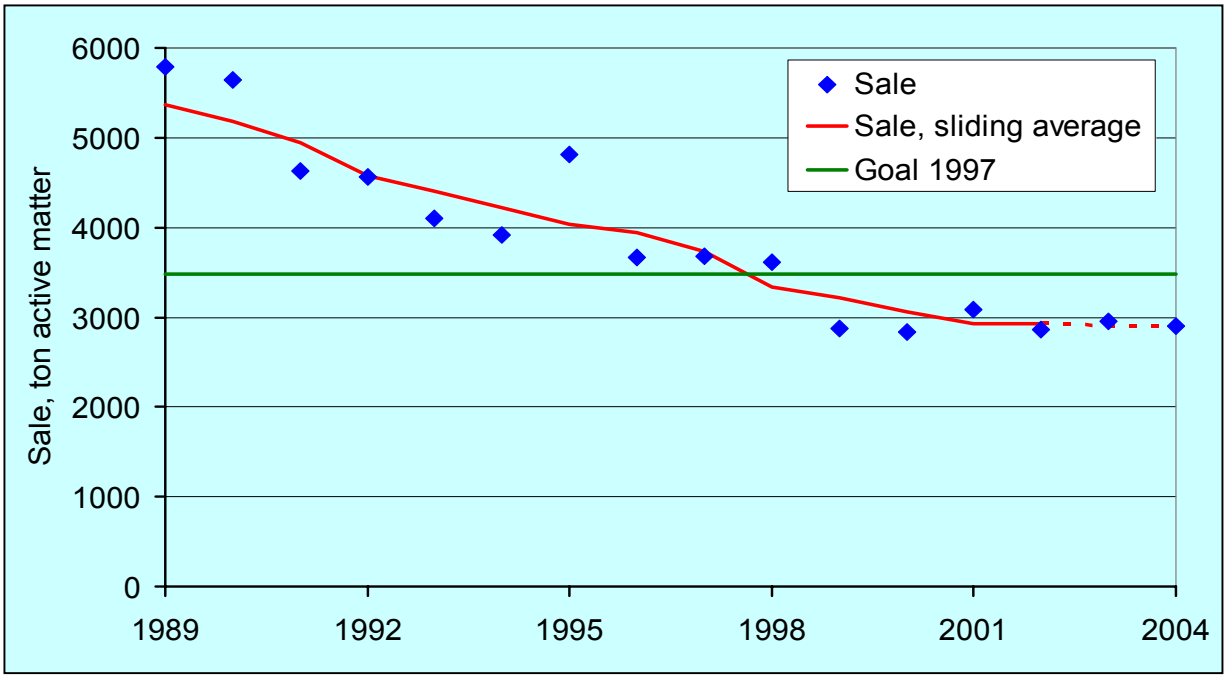


Figure 7.8: Development of the consumption of pesticides in Denmark since 1989. The decrease of around 50% in the shown period is much effects of a) use of reduced doses, b) fewer treatments, c) excise tax on pesticides, and d) better maintained and calibrated equipment. The pesticides have become more concentrated in the period, but the yields, and thereby the need for spraying, has increased considerably in the period, as illustrated in Figure 7.6.

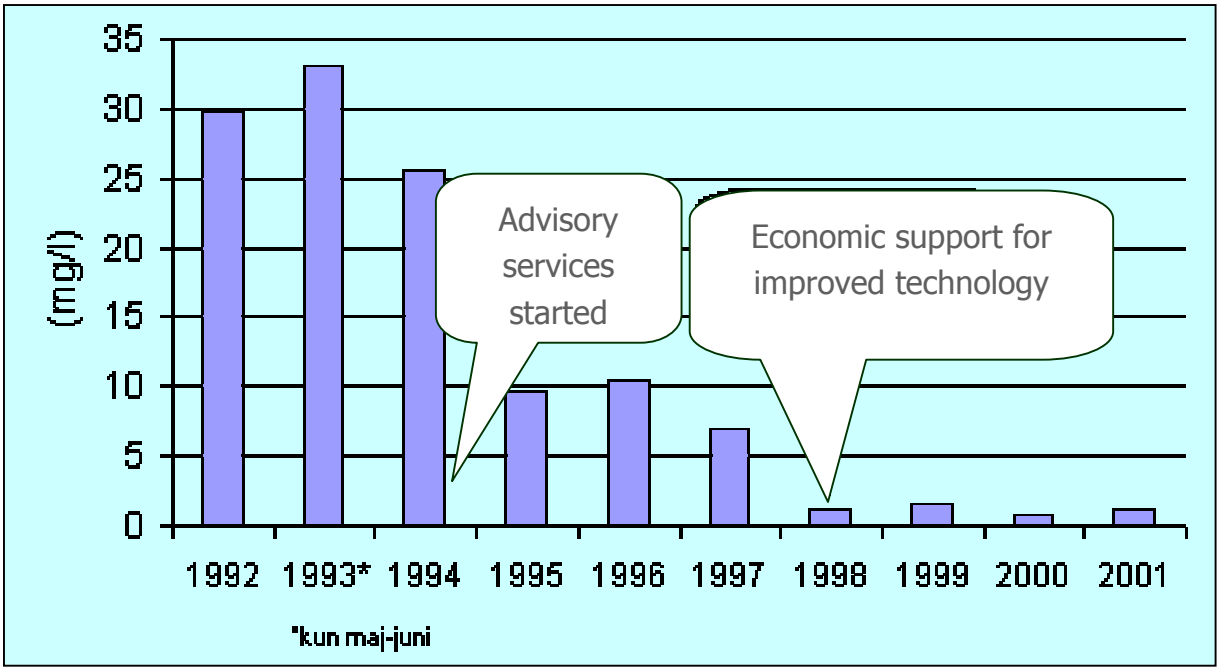


Figure 7.9: Example from a Swedish project on the effect of advisory services to farmers in a specific Swedish river basin on the residues of pesticides in waters – 60% reduction. If it in addition to advice (on use of reduced doses) also is ensure that the spraying equipment is correct maintained and calibrated, then the residues in the waters are almost eliminated.

7.4. Gathered information and analysis of it

7.4.1. Plant nutrients in livestock manure

The assessment of the amount of nitrogen and phosphorus in the livestock manure production is based on time series statistics on livestock number and estimation of the livestock manure production.

Table 7.4 shows the livestock number (standing stock) for major livestock types as cattle, pigs, chicken and sheep. This means that for instance hens, goats, horses and other types of livestock is not included, as they are considered to play a minor role in this connection. There are of different reasons no data for 1985 and 1990 for some of the countries.

Table 7.4: Number of cattle, pigs, chicken and sheep in the lower Danube countries (Source: FaoStat).

	1985	1990	1995	2000	2005 "Now" scenario	Maximum "Normal" scenario
Bosnia and Herzegovina						
Cattle			518,700	461,928	440,000	518,700
Chickens * 1000			2,800	4,700	9,000	9,000
Pigs			290,000	355,000	600,000	600,000
Sheep			520,000	661,641	900,000	900,000
Croatia						
Cattle			493,418	426,570	471,025	493,418
Chickens			10,724	10,351	10,641	10,724
Pigs			1,174,602	1,233,000	1,205,000	1,233,000
Sheep			452,932	528,675	796,480	796,480
Serbia and Montenegro						
Cattle			1,950,000	1,427,000	1,254,000	1,950,000
Chickens			23,491	18,948	15,221	23,491
Pigs			4,192,000	4,087,000	3,189,000	4,192,000
Sheep			2,671,000	1,917,000	1,828,000	2,671,000
Ukraine						
Cattle			19,624,300	10,626,500	6,952,700	19,624,300
Chickens			136,000	118,000	129,500	136,000
Pigs			13,945,500	10,072,900	6,466,100	13,945,500
Sheep			4,792,500	1,059,500	8,752	4,792,500
Bulgaria						

	1985	1990	1995	2000	2005 "Now" scenario	Maximum "Normal" scenario
Cattle	1,751,305	1,575,107	638,238	681,661	671,579	681,661
Chickens	40,666	35,033	17,822	13,919	18,000	18,000
Pigs	3,733,940	4,352,000	1,986,180	1,512,340	931,402	1,986,180
Sheep	10,500,658	8,130,305	3,397,610	2,548,884	1,692,507	3,397,610
Romania						
Cattle	7,039,000	6,290,700	3,480,800	3,051,000	2,812,000	3,480,800
Chickens	123,961	113,968	70,157	69,143	89,455	89,455
Pigs	14,776,700	11,671,000	7,758,000	5,848,000	6,589,000	7,758,000
Sheep	18,636,800	15,434,800	10,896,600	8,121,000	7,430,000	10,896,600
Moldova						
Cattle			831,611	422,969	331,000	831,611
Chickens			14,362	12,535	17,442	17,442
Pigs			1,061,406	682,600	397,000	1,061,406
Sheep			1,410,887	930,229	823,000	1,410,887

It should be noted from the table, that the number of livestock today (2005) has gone dramatically down as compared to the years 1985 to 2000. See for instance Ukraine, where the number of cattle today only is around one third of the level in 1995. There are no doubts that the number of cattle will increase again along with the normalisation of markets, infrastructure, etc.

It is necessary to know the categories of livestock behind the figures, as a dairy cow of course produce more manure than a young stock etc. FaoStat does not provide such detailed information so the following definitions have been made to make it possible to calculate production from number of livestock:

- Cattle: Typically the production comprise per 1 dairy cow also 1.1 female young stock (from birth to calving) and 0.5 male slaughter calf (from birth to 12 months/slaughter)
- Chicken: 1 chicken is understood as 1 chicken produced from 0 to 42 days
- Pigs: Typically the production comprise per 1 sow including gilts and porkers also the production of 15 piglets and fatteners produced from birth to 105 kg / slaughter/ 200 days
- Sheep: Typically 1 sheep with lambs produced.

The Project has made an estimated manure table from where the production of nitrogen and phosphorus appears – see Table 7.5.

Table 7.5: Production of nitrogen and phosphorus by different livestock types, and the corresponding Animal Units and Phosphorus Units

	Production of plant nutrients in manure				
	N (kg)	P (kg)	Animal Units[3]	P-Units[4]	Basis
Dairy cows, 6.000 kg milk	79.1	15.5	0.79	0.67	Year
Dairy cows, 4.000 kg milk	61.2	12	0.61	0.52	Year
Female young stock	38.7	9.1	0.39	0.40	Year
Male young stock	32.3	8	0.32	0.35	Year
Chicken	0.5	0.3	0.01	0.01	Produced animal
Sows with piglets	31.1	8.8	0.31	0.38	Year
Fatteners	3.43	0.74	0.03	0.03	Produced animal
Sheep with lambs	14.8	3.2	0.15	0.14	Year

The Animal and P Units, reflecting the livestock manure production, are defined as 100 kg nitrogen and 23 kg phosphorus ex storage, respectively. This means that 1 Animal Unit yearly will produce an amount of livestock manure that contains 100 kg nitrogen ex storage, meaning nitrogen that principally is available as plant nutrient. Similarly one P unit produces 23 kg phosphorus ex storage, no matter whether the P unit deals with cattle, pigs or other types of livestock.

Table 7.6 provides coefficients for Animal Units and P Units for the standing stock of cattle, pigs, chicken and sheep, given the production of nitrogen and phosphorus and the defined structure of cattle and pig herds as described above. The coefficients are different for the 2005 (Now) and 2015 (Normal) scenarios due to the expected change of productivity in the dairy and pig production.

Table 7.6: Calculated Animal Unit and P unit coefficients for different livestock types

	Animal Units per head		P-Units per head	
	1985-2005	2015	1985-2005	2015
Cattle	0.461	0.530	0.435	0.493
Chicken * 1000	5.000	5.000	13.043	13.043
Pigs	0.090	0.083	0.094	0.086
Sheep	0.148	0.148	0.139	0.139

The number of Animal Units and P nits are now found as product of the information in Table 7.6 and Table 7.5. See Table 7.7.

[3] One Animal Unit is here defined as 100 kg nitrogen ex storage pr. year.

[4] One Phosphorus Unit (P Unit) is here defined as 23 kg phosphorus ex storage

Table 7.7: Calculated number of Animal Units and P Units in the lower Danube countries now and in the normal situation (scenarios "Now" and "Normal")

	AU			P Units		
	"Now" 2005	"Normal" 2015	Expected increase in animal units, %	"Now" 2005	"Normal" 2015	Expected increase in P units, %
Bosnia-Herzegovina	434,867	503,172	16	490,296	550,057	12
Bulgaria	733,643	1,119,765	53	849,776	1,214,295	43
Croatia	496,233	535,842	8	567,571	599,977	6
Moldova	397,229	825,327	108	523,235	925,253	77
Serbia and Montenegro	1,210,581	1,895,895	57	1,297,579	1,999,982	54
Romania	3,433,886	4,551,839	33	4,041,998	5,066,197	25
Ukraine	4,434,579	12,954,299	192	5,321,266	13,321,400	150

It is seen from Table 7.7 that the livestock production, expressed in Animal and P Units are expected to increase in all lower Danube countries, and especially in the largest of the countries, namely Ukraine.

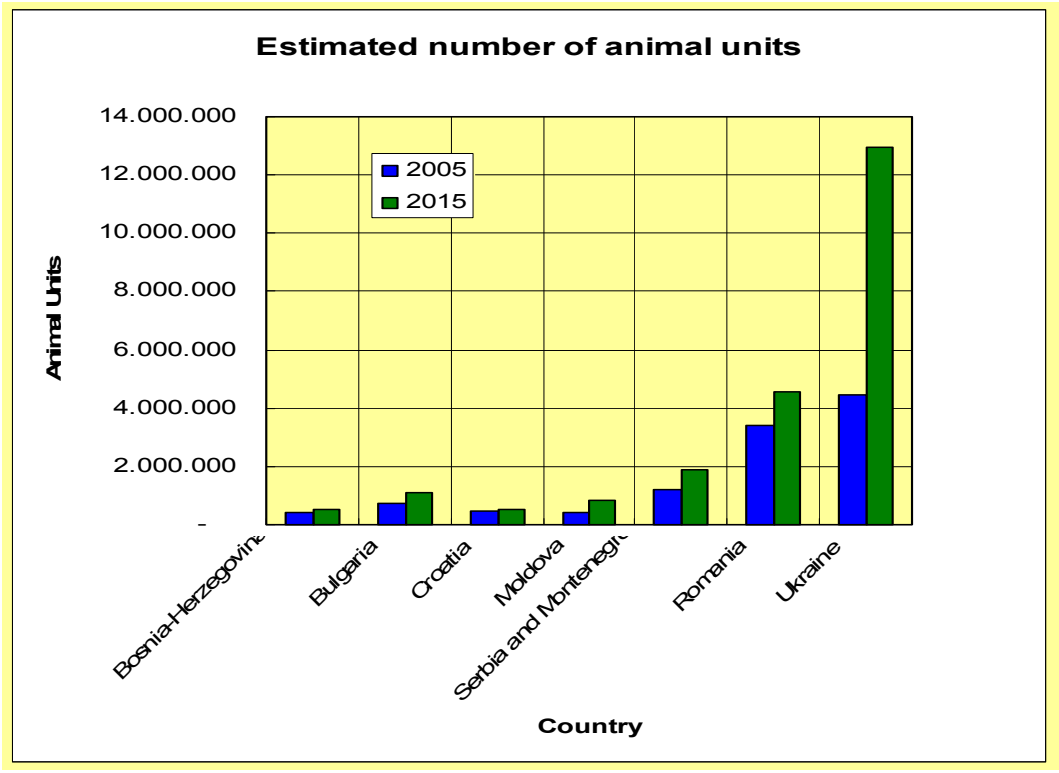


Figure 7.10: Comparison of present and future (Now and Normal scenarios) number of animal units in the lower Danube countries. The number of animal units is expected to increase almost 3 times in Ukraine.

The environmental impact of the BAPs is now calculated. The estimated leaching of nitrogen to the environment from the livestock production in 2005 in Bosnia-Herzegovina is found as 434,867 Animal Units x 100 kg nitrogen /Animal Unit x (100% - 10% field effect) = 39,138 tonnes of nitrogen. See Table 7.8, where other figures are calculated in the same way.

Table 7.8: Run-off to the environment in the 4 scenarios

	Runoff to the environment, tonnes pr. year							
Scenario	Now/No		Now/Yes		Normal/No		Normal/Yes	
Plant nutrient	N	P	N	P	N	P	N	P
Bosnia-Herzegovina	39,138	5,638	17,395	2,255	45,286	6,326	20,127	2,530
Bulgaria	66,028	9,772	29,346	3,909	100,779	13,964	44,791	5,586
Croatia	44,661	6,527	19,849	2,611	48,226	6,900	21,434	2,760
Moldova	35,751	6,017	15,889	2,407	74,279	10,640	33,013	4,256
Serbia and Montenegro	108,952	14,922	48,423	5,969	170,631	23,000	75,836	9,200
Romania	309,050	46,483	137,355	18,593	409,666	58,261	182,074	23,305
Ukraine	399,112	61,195	177,383	24,478	1,165,887	153,196	518,172	61,278
Total	1,002,692	150,555	445,641	60,222	2,014,753	272,287	895,446	108,915
Saved runoff			557,051	90,333			1,119,307	163,372

It can on the basis of the used methodology, assumptions and definitions be concluded, that the introduction of the 12 BAPs dealing directly or indirectly with livestock manure management would save the environment for 557,000 tonnes of nitrogen and 90,000 tonnes of phosphorus. However, as the livestock production and productivities are expected to be normalised in the lower Danube countries after a period of transition, the effect would rather be 1.1 million tonnes of nitrogen and 163,000 tonnes of phosphorus.

7.4.2. Pesticides

Information about the pesticide use has been found at the FaoStat online and is seen in Table 7.9.

Table 7.9: Consumption of herbicides, fungicides and insecticides in the lower Danube countries - Denmark is included as well to illustrate the effect of introduction of integrated pest management (Source: FaoStat)

	Consumption, tonnes					
	1985	1990	1995	2000	2005	Maximum
Herbicides						
Bulgaria						
Croatia			2,037			2,037
Denmark		3,128	3,222	1,933		-
Moldova, Republic of						
Romania		7,567	8,147	3,869		8,147
Serbia and Montenegro			1,552	1,673		1,673
Ukraine					Nederst på formularen	
Fungicides and bactericides						
Bulgaria						
Croatia			1,142			1,142
Denmark		1,396	1,257	827		1,396
Moldova, Republic of						
Romania		11,891	8,342	4,318		11,891
Serbia and Montenegro			911	715		911
Ukraine					Nederst på formularen	
Insecticides						
Bulgaria						
Croatia			204			204
Denmark		259	23	53		259
Moldova, Republic of						
Romania		5,797	3,624	1,239		5,797
Serbia and Montenegro			924	601		924
Ukraine					Nederst på formularen	

The data for countries and years is missing in many cases, but the general impression is that the consumption of pesticides have decreased drastically in the lower Danube countries from 1990 and 1995 due to the transitional problems. Figures for the Now scenario (2005) are missing, the latest available data are from 2001 and suggests further decline in the pesticide consumption.

Table 7.10: Consumption of herbicides, fungicides and insecticides on a yearly basis in the lower Danube countries pr. ha in scenario "now" and scenario "normal" (Source: FaoStat)

	Agricultural area, 1,000 ha	Consumption of pesticides, tonnes herbicides, insecticides and fungicides now (Scenario "Now")		Consumption of pesticides, tonnes herbicides, insecticides and fungicides in a normalised situation (Scenario "Normal")	
		In total, tonnes	Per ha agricultural area	In total, tonnes	Per ha agricultural area
Bosnia and Herzegovina	2,130		-		-
Bulgaria	5,582		-	0	-
Croatia	3,156		-	3,383	1.07
Moldova, Republic of	2,544			0	
Romania	14,857	9,426	0.63	25,835	1.74
Serbia and Montenegro	5,587	2,989	0.53	3,508	0.63
Ukraine	41,406				
Average			0.58		1.14

Given the assumption mentioned above, that the implementation of 3 BAPs concerning pesticide use could have the impact that the doses could be reduced to 50% with the same effect, this means that the environment and the food chain could be saved from 6,207 tonnes pesticides in the "Now" scenario, and 16,363 tonnes pesticides in the "Normal" scenario. As the data is only available for Romania and Serbia and Montenegro (and partly Croatia) these estimated impacts of the BAPs on pesticides relates to only 27% (31% with Croatia) of the agricultural area of the lower Danube countries. The possible impacts on the entire agricultural area in the lower Danube countries, found by simple extrapolation, is the saving of the environment and the food chain from 22,800 tonnes pesticides in the "Now" situation and 52,000 tonnes in the "Normal" situation.

The estimates concerning the impacts of BAPs concerning use of pesticides are based on extrapolation of a weak statistical basis.

7.4.3. BAPs at 8 pilot farms in Serbia

The following Table 7.11 shows the number of livestock and the agricultural areas of the farms:

Table 7.11: Number of livestock and area of the pilot farms in the "Now" situation.

	Aleksandar Moldovan	Radovan Padejski	Rajka Kandic	Boris Dragisha	Dushko Churchin	Stojan Stajic	Dragan Dzenopoljac	Ishtvan Gligor
No. of livestock								
Sows (solid manure)					27.5	2.5		2.0
Sows (slurry)				63.3				
10 piglets produced				127.0	50.0	2.0		2.0
10 fatteners produced (solid manure)								2.0
10 fatteners produced (slurry)			140.0	127.0	30.0	2.0		
Dairy cows (high yields)	19.0							
Dairy cows (medium yields)		140.0				3.0	21.5	5.0
Heifers	7.0	50.0				2.5	2.0	3.5
Calves	2.0	10.0				2.5	13.5	3.0
Bulls for slaughter						1.0		1.5
Sheep		15.0						
100 laying hens			10.0					

	Aleksandar Moldovan	Radovan Padejski	Rajka Kandic	Boris Dragisha	Dushko Churchin	Stojan Stajic	Dragan Dzenopoljac	Ishtvan Gligor
Amounts calculated from number of livestock								
Ha	55	30	40	200	11	18	100	18
Ton manure	336	1,972	859	1,345	239	81	292	110
Kg N	1,725	10,342	5,452	6,918	1,912	440	1,503	580
Kg P	343	2,062	1,249	1,698	523	102	311	132
Kg K	1,848	11,409	2,575	3,357	688	342	1,540	519

The 8 pilot farms have in total 288 Animal Units[5], and grow 472 ha. It has been estimated, that they on this basis, using the same assumptions as for the entire lower Danube area, with implementation of the BAPs could save the environment for:

- 14,436 kg nitrogen per year
- 1,926 kg phosphorus per year
- 166 kg pesticides per year

Three of the farms (Padejski, Kanic and Churchin) have initiated a substantial increase of their livestock numbers, therefore the environmental impacts of the BAPs would be much increased in the future.

[5] 1 Animal Unit is defined as the number of livestock that produces 100 kg nitrogen in manure ex. storage pr. year.

8. AGRICULTURAL POLICY IN SERBIA

This chapter was elaborated in cooperation with MAFWM officials and derived also from the assessment of the legislation (see report on attached CD "Analysis of Current National Legislation about Fertilizers, Manure and Pesticides, August 2006").

Although this chapter addresses the specific situation in Serbia, the Project considers that the issues and lessons learned are of Danube Basin wide relevance.

8.1. Policy

Agricultural policy in Serbia is clearly oriented towards EU. The long term Serbian agriculture strategy is striving towards environmentally friendly agriculture practice which can preserve environment and natural resources.

An agricultural strategy was adopted in 2005 as a blueprint for transition towards a more competitive and market driven agricultural sector, which is considered to be the engine of rural development. Within its outline the strategy deals with rural development at the conceptual level defining directions for future development of rural areas and listing possible areas of intervention.

8.2. Strategy

The strategy is placed on several pillars with EU integration and preparation for the succession to WTO as main driving processes:

- Developing a sustainable and efficient agricultural sector that can compete on the world market, contributing to the raise of national income
- Providing food that meets the society needs concerning quality and safety
- Ensuring support of life standards for people who depend on agriculture and are not in the condition to follow economy reforms with their development
- Supporting development of the villages
- Preserving the environment from the destructive influences of agricultural production.

Within these objectives, the rural support measures are defined, based on the social, economic and environmental rank of objectives, including farm investment and farm structure support, rural development measures and improvement of product quality.

Rural programming is done on a yearly basis, with MAFWM as lead institution that defines priorities. As of 2005, it is grounded on the Agricultural Strategy which objectives are translated to rural sector as a whole. The Strategy was adopted after several months of public consultation meetings and fairly

participatory approach in its formulation. A number of sector analysis meetings, as well as public hearings took place in order to formulate the objectives and priorities. This qualifies the agricultural sector programming to being fairly participatory and public driven.

Objective of Rural Development (in Agricultural Strategy)	Action plan
Creating specific social and economical conditions in rural areas and secure their contribution to the economic growth of the country	Adopting main principles of rural development policy
	Categorise according to the EU methodology the Less favoured areas
	Develop programme for agro-environmental schemes especially for marginal areas and nature protected areas
	Develop local rural development action plans
	Establish Agency for Rural Development
	Prepare institutional structure for implementation of national financed measures as well as donor supported rural development programmes

This orientation is so far not bound through legislation since the Ministry of Agriculture, Forestry and Water Management failed to pass a new law on agriculture through the Government before the premature elections in spring of 2007, so the framework for rural programming which is providing certain long-term support to agro-environmental measures also has to wait probably until the end of year 2007. There is also lack of interest to introduce for instance EU's Nitrates Directive in to the Serbian legislation since the responsible Phytosanitary Directorate still thinks that revisions of laws towards best practices as stipulated by the EU will not be realistic for application in the next few years. It therefore prefers the gradual changing of legislation by:

4. introducing first education and public awareness actions in line with best practices,
5. then offering financial support (through rural development support grant scheme) for setting up appropriate production practices, and
6. at last pressing farmers with mandatory obligations.

This happens because Serbian agriculture production has at the moment still not reached the level it had 10 years ago, although the production is more stable than it might look like. At the same time this lower intensity is creating lots of troubles in the production chain which possibly should be addressed with higher priority.

8.3. Political considerations

Getting assistance from international experts to work on reduction of pollution is helping the Serbian government to move faster towards understanding that all problems mentioned above actually have to be addressed at the same time since the dilemma, whether Serbia should develop first and then take

care of the environment later, or Serbia should start taking care of the environment before developing, actually does not exist.

The problem with legislators in Serbia is also sometimes that for instance results of Danube water tests are not accepted as relevant for Serbia, since most parts of the river are international and pollution is coming from all around. Serious mine accidents in Rumania (like the Aurul mine accidents at the beginning of year 2000, where large amounts of cyanide came from destructed flotation deposits of the silver mine in Romania and ran into the Danube River tributary Tisza trhough Szamosh river) for instance, are putting agricultural pollution in Serbia somewhere behind as less important in general. Also pollution from agriculture is regarded as less important by legislators because of the relatively lower intensity of agriculture production and decreased use of chemicals compared to communist times.

8.4. Legislation

To develop fertiliser legislation and agrochemical inventories in line with international standards (EU Nitrates Directive, IPPC Directive, Pesticide Directive) seems not to be too heavy a task, however, implementation seems not possible at the moment because of lack of institutional capacities e.g. inspection, but also because of lack of real incentives for producers. Also the procedures for legislation should be adopted by legislators (Parliament and Ministries). It is a long-standing process in a country like Serbia because of an extremely unstable political situation. Recent changes in politics, for instance, will prevent the Parliament of Serbia to do its legislation work for almost half year, which also makes proactive work of the Ministry of Agriculture, Forestry and Water Management fruitless.

Serbia has quality requirements to fertilisers and other agrochemicals including labelling and instructions to users which are defined in respective legislation. Also some obligations in relation to a systematic soil fertility control are presently on the way in the Draft Law on Plant Nutrient. Quality requirements for agrochemicals are assigned to the Phytosanitary Directorate, and soil fertility control is connected to the Soil Department and Agriculture Inspection. According to the new Serbian Soil Law the Soil Department will become the Soil Directorate, a change which is raising its importance. The Serbian Phytosanitary Directorate is very advanced in its work methodology and really developing in a good direction, however, it still needs a lot of capacity building regarding the designation of jobs and institutions involved in direct control.

Serbia has restrictions for the use of fertilisers near lakes, rivers and watercourses but not clearly for N-vulnerable zones. The implementation of this legislation is the responsibility of the Directorate for Environmental Protection. The cooperation between institutions of agriculture and environment, however, is still not set-up properly and in some cases jurisdiction is overlapping or gaps exist, as for instance between the Water Directorate of the Ministry of Agriculture, Forestry and Water Management and the Directorate for Environmental Protection.

Serbia still has no clear requirements for storing liquid or solid livestock manure with the exception of large farms. On large farms this requirement exists for registering farms with the Veterinary Directorate. Also some requirements to avoid water pollution and infiltration into the soil exist. Recommendations like minimum storing capacity of manure for at least 1 year’s manure production and recommendations related to spreading of manure in the growing season and to ploughing it into the soil immediately after spreading are regularly used in the advisory practice. This means that even though no clear requirements are existing, at least at that level there are efforts made to implement them in practice, though they are not completely accepted.

Restrictions and requirements for using manure and agrochemicals in water protection zones along lakes, rivers and watercourses exist and Serbian Ministry of Agriculture, Forestry and Water

Management is financially supporting investments in storage capacity of livestock manure. Serbia has established a Fund for Environmental Protection in 2005, which in the future will continue even stronger to support agro-environmental measures.

8.5. Institutional set-up and enforcement

The enforcement of the existing policy seems lagging behind schedule in Serbia as in all other surrounding countries. Inspection is still weak regarding agro-environmental issues. However, the institutional set up is providing inspection services in charge for all important aspects of the agro-environment :

- water inspection (MAFWM Water Directorate),
- soil inspection (MAFWM Sector for Inspection),
- phytosanitary (MAFWM Phytosanitary Directorate)
- veterinary inspection (Veterinary Inspection),
- environmental (Ministry of Science and Environment)
- communal inspections (Ministry of Capital Investments).

The recent development of diverse internationally supported programs and projects are helping to build capacity within inspection services regarding reduction of pollution from agriculture. In 2006, the Serbian Ministry of Agriculture, Forestry and Water Management has established a centre for training in this branch which is developing training programs and curricula and is providing training of trainers in the Institute for Animal Husbandry in Belgrade.

The capacity of the advisory services is, however, still to be worked on to be able to help farmers' communities to implement Best Agriculture Practices and respond to future hard legislation requests to be posed. Development of curricula to a certain extent was done during the Project through e.g. publishing a brochure on Best Agriculture Practices, which is available on the project homepage, but work should be continued to complete materials for all available best practices which were not included since they appeared to be less important in connection with the 8 farms included in the Pilot Project.

8.6. Support schemes

Serbia is still far away from joining the EU, although its Government clearly stated that wish. Public awareness and knowledge about what such a decision means is still low, particularly in case of environmental issues. Consequently national agricultural policy in still not completely in line with the quite complicated set of EU rules for the 15 old member states (EU15) as e.g. cross-compliance for direct support to farmers and the control system IACS. However, the Serbian MAFWM did start with a SAPARD like rural development support scheme with its own means e.g. MAFWM budget (rural development support grant scheme). Under this national scheme, support is provided for modernisation of farms including manure and slurry storages, purchase of machinery, solving rural communities' problems with manure etc.

The budgetary support provided by MAFWM is grouped in three categories:

1. Structural payments: (investment and rural development support)
2. Market support (direct payments)
3. Credit support (short and mid-term credits).

In the period of 2003-2006 a significant increase of budget of MAFWM has been observed, while at the same time the budget structure changed. The shift from market support and input subsides to structural adjustment measures translated into significant policy adjustments entailing around 20 new measures compared to 2003.

The rural credit support was established in 2004 and grew to 40 millions Euro, market support has decreased to half of its 2004 level, while structural support has grown from about 11 million Euro to 47 million Euro in 2006. Rural credit support is offering a possibility but never has so far been used by farmers for investing in agro-environmental measures.

Structural support has been grouped in four categories corresponding to measures of EU CAP Pillar 2 and is shown in the following table:

Measure	**Sub-measure**	**budget in %**	
		2003	**2006**
Investment in farms		**0.6**	**14.7**
	1. Measures for improvements in livestock breeding		
	2. Construction of storage capacities		
	3. Purchase of new agricultural equipment and mechanization		
Improvement of farm structures		**0.0**	**14.9**
	1. Early retirement scheme	0.0	14.1
	2. Land renting support	0.0	0.8
Rural development			**5.4**
	1. Improvement of production and marketing		
	2. Rural infrastructure		
	3. Development and promotion of rural areas, environmental protection and protection of rural countryside		
	4. Organic production promotion and development		
Quality support measures			**2.3**
	1. Standardization (HACCP, organic production)		
Measures for land improvement		5.0	1.7
Environment protection		0.1	0.3
Quality improvement		2.3	3.7
TOTAL RURAL DEVELOPMENT AND STRUCTURAL SUPPORT		**8.0**	**43.0**

This support is used for agro-environmental investments on farms and in rural environment in general, but not too often as one can see from the table (0.1 to 0.3 % of the available budget). Reasons for that are that farmers are still not familiar with the possible benefit of such measures and still do not see these investments as their priority. There is a lack of information about kinds of investments and their economic justification as much as a lack of information on their impact on natural resources (land, waters and air) and their return effect on farm and rural economy, rural community living standard and its general welfare and protection.

Serbia will soon have the same technical and financial assistance through IPA funds, as from other multilateral and bilateral donors. There is therefore a need to further improve the grant scheme and paying system. This assistance will be mostly for capacity building within State institutions, but it is also available for transboundary projects which might be of extreme importance for the reduction of the pollution in the international waters of the region. Potential donors are responding very positively to the recent development of agro-environmental support schemes within the rural development grant program of the Ministry of Agriculture, Forestry and Water Management. Actually, to be able to receive money from IPARD funds, Serbia has as prerequisite to make firm agro-environmental, rural development and regional development programs. This prerequisite will have an effect in turn on further strengthening of the agro-environmental program and the awareness on agro-environmental issues. This will make any further actions and projects in this area more accepted and welcome in Serbia.

At the moment an investment support system in Serbia is developed (rural development support grant scheme run by the Sector for Rural and Agriculture Development of MAFWM) to ensure the interest for upgrading of production systems, independent of the fact that policies for reducing the pollution from agriculture are not yet set up completely. The Serbian Government is trying to go forward to meet obligations which will be posed by joining EU by using the 'first carrot and then stick approach'. It is trying to get farmers into investing on their farms to reduce pollution by matching own funds and the grant they can apply for from the MAFWM budget.

The problem with financial support schemes in Serbia is the still underdeveloped paying system which is making payments uncertain and administration slow. Farmers are invited to apply for grants every year in February through open announcement. The applications are processed by MAFWM Sector for Implementation and evaluated by commissions, after which a contract is signed with the applying farmer to start work and deliver receipts for investments made. After that reimbursement is made directly to the farmer's account. Only registered farmers, in paying contribution to the agriculture fund and younger that 40/50 (in LFAs) are eligible for this scheme. This situation will soon rapidly change with establishment of a paying agency which is foreseen to work on the basis of EU rules, but still some time is needed. This is particularly the case for the Voivodina province, where the system from the previous republican ministry was purely copied and still is not working properly since capacities are presently even lower than during the republican system.

Serbia is still far from having developed a clear agro-environmental strategy and ad-hoc actions and measures, done in a proper way, are rare and not fixed with any law. So they are not obligatory for Governments which are often changing. Most of the leading people, decision makers in Ministries, are yearly changed and depend mainly on the talent and understanding of a few individuals which play an important role in policy making. Further technical assistance is needed to move from ad-hoc to systematic measures. Different donors' assistance is needed to establish a comprehensive agro-environmental strategy and reach a high level of provisions in comparison with the EU acquis. And even when an agro-environmental strategy is developed, a big gap between the provisions and the actual enforcement and control will probably still remain for long period of time.

9. COOPERATION WITH PILOT PROJECT FARMERS

The steps taken in the planning and implementation of the Pilot Project are described under "Task 5: Preparing Detailed Work Programme for Pilot Projects"(chapter 3.2.1) and "Task 6: Implementing Agreed Pilot Project" (chapter 3.2.2).

9.1. Experiences

Establishing contacts to potential Pilot Project Farmers

During implementation of the Pilot Project (January-December 2006.) the project experts and local team leader visited all farms in the Pilot Project in February, March, May, August, September and December.

The first list of farms that could be involved in the Pilot Project was based on recommendations from the Ministry of Agriculture, Forestry and Water Management, Provincial Secretariat for Agriculture and Institute of Agriculture in Zrenjanin. All the farms were informed via phone calls about this Project and its main targets. The occasion was also used to schedule a meeting in order to explain everything in a more detailed way and find answers to all questions. Twelve farms were contacted out of which eleven expressed interest in cooperation. Only one owner of a farm refused cooperation because his application for financial support with the Ministry of Agriculture, Forestry and Water Management had been denied.

During the meetings with farmers and farm chiefs the Project was thoroughly explained to them, as well as the planned activities and the benefits for the farms if they participated in the Project. They all confirmed their interest in cooperation with the Project and submitted all necessary information about their farms.

Selection of pilot farms

Three very big farms, earlier state-owned, were among the farms considered. They were privatized and owned by big companies with focus on short time profit on their investment. The Project was not able to contribute to the solving of the problems in a significant way on these big farms, because the necessary investment in improved manure handling were too big, so the Project renounced further work on them.

The Pilot Project finally included 8 private farms. The main motives of the farmers for cooperation with the Project were: new knowledge, the financial help for building manure storage and procurement of modern machines for manure spreading.

Discussions with farmers regarding investment in manure storage facility

The Project investigated all possibilities for establishing manure storage facilities and purchasing equipment for manure handling.

The Project supported 7 of the 8 Pilot Project farmers in applying for support from the Provincial Secretariat for Agriculture in Vojvodina for manure storages and slurry spreading equipment. The first term promised for publication of replies was July, then August, September and finally November. Finally, the contest was cancelled without explanation from the Provincial Secretariat for Agriculture.

The main motive for applying for financial support for the Pilot Project farmers was that the current problems with storing the manure and manure application would grow with time and that the expenses of making the storing place were too big for the farmers. That is why it was logical for all of them to apply for financial support from the State. With the Project's financial support, their own expected participation would be even lower. The bigger Pilot Project farmers were fully aware of this and it did not take much to persuade them that manure storages were needed. It took more to persuade them that this was the right moment to prioritise the question of manure storing and to spend some money on it. The small farmers had a lot of more urgent problems and priorities than the manure, and both money and purpose were important issues for them.

The project team took into consideration all possible plans for finalization of the project activities on Pilot Project farms in the given situation in October. The final solution was made in November: to provide pesticide safety agrochemical cabinets to interested pilot farmers and to build one manure pad. Labels for pesticide safety cabinets were designed by the Local Pilot Project Expert. The Project provided 5 pesticide safety cabinets for farmers which expressed their interest. The farmers' contribution was 5% of the cabinet price. The Project provided technical and financial support for building one manure pad. The farmer's contribution was 7% of the price. This contribution was relatively lower than initially planned minimum contribution of 10%, because the final price for the construction of the manure pad was higher, than initially agreed.

9.2. Feedback from Pilot Project farmers

An interview with all pilot farmers about their perception of the Pilot Project was made in September 2006. The reply from the Regional Secretariat for Agriculture about assigning financial support for the construction of manure storage and procurement of modern liquid manure spreading equipment was still being waited for at the time of the interview. All planned seminars were realized and soil analyses and fertilizing planning were in the final stage.

Methodology

All farmers were interviewed at their farms. The interviewers were: Local Team Leader and Local Pilot Expert. They used a printed questionnaire prepared in advance. The interviews were done on 16-17 September, 2006.

Summary of interviews

A summary of the remarks and opinions of the pilot farmers is presented in the following:

1. Benefit for the farmers of the Project

The benefits are:

- considerable amount of new knowledge and information on modern agricultural production,

- visit to Denmark and opportunity to see a lot of modern machinery and equipment on the fair and well organized, profitable dairy farms,

- visit to the successful group of farmers which jointly procured and used agricultural machinery.

The farmers assessed the Project's seminars as useful and very useful, especially the following topics: nutrition of cows and pigs, usage of slurry, financial losses because of bad manure storage and its untimely application.

Out of the novelties they heard about and saw over the course of the Project, they have implemented:

- soil analyses as a base for planning the fertilizing (all farmers)

- advices of project experts about kind and quantity of fertiliser to apply on their fields (all farmers),

- controlling qualitative and quantitative analyses of concentrate to be used in cattle nutrition (some farmers)

- better agrochemical methods (some farmers).

2. Expectations to the Project that have been fulfilled

Farmers said that they had gained a considerable amount of new knowledge and information on modern agricultural production, both from Danish and local experts. They also pointed out that it was very useful to hear again about something which they had only partly known before. Generally they stated that the Project had fulfilled their expectations concerning education.

3. Expectations to the Project that have not been fulfilled

The farmers expected finalization of the financial support for building modern manure storage and procurement of equipment for manure applying.

4. Additional support needed to implement the Project BAPs

All farmers need further advice and financial support for implementation of all proposed BAPs.

5. Other remarks and opinions

All farmers expected the plans that had been presented to them at the beginning of the Project, to be fulfilled. They underlined the expectations to gain insight into new knowledge and information about modern agricultural production. They stated that the Project had provided valuable information but they would like the Project to continue to learn more. Further they emphasised the need to continue the effort by the Project to facilitate financial support from Serbian Grant Schemes supplemented by Project funding for building modern manure storage and for procurement of manure spreading equipment .

They suggested other topics they would like to hear more about:

- optimizing of crop production (with the least possible expenses and highest possible production),

- exchange of practical experience on farmer-farmer and farmer-expert (lecturer) basis,

- construction and usage of modern farm for 30 dairy cows,

- more details on usage of slurry and green manure ,

- recommendations for dynamic planning of nutrition and fertilising in the light of current prices of farm inputs and outputs.

They would also like to see:

- practical presentation of new equipment and technology for manure and slurry spreading,

- practical demonstration of the effects of timely and proper fertilising on farmers' pilot fields over one season.

The 3 farmers that visited Denmark were very satisfied with this visit. They highly stressed that it was very useful to see modern machinery and equipment on the fair and well organized, profitable dairy farm. They mentioned that it would be good to see more farms in Denmark and see real examples of spreading of manure and mineral fertilisers as well as their storing.

The four farmers from the Pilot Project that visited a group of farmers situated near the town of Nis, which jointly procured and used agricultural machinery, stated that it was very good and useful that they were given this opportunity to meet. They consider that it would be possible to organize such groups of farmers for joint procurement and usage of agricultural machinery in their village, too. They differ in the estimations on how many members an effective group could have (4-10), but they agree that it should be composed of economically more or less equal farmers and not older in age than 40.

All farmers are interested in further participation in this or similar projects.

6. General impression on pilot farmers' decision making

After the first meeting with the Project the farmers had only a vague picture about its course and aims although everything was clearly explained to them and answers were given to further questions. It was only after the third meeting and several times answering the same questions that they had a clear picture about the course and aims of the Project. Two months passed in the meantime. Realizing all the benefits from the Project as well as making the decision whether the benefits of the manure BAPS were higher than the costs consumed three months more. The need to submit the documentation until the end of the month for the application for state financial support helped the process of decision making. Also the contacts with the project staff helped the individual processes.

The farmers are of the opinion that the Project was too short in order to fulfil everything planned and to see the effects of the activities made. The Project was nearing its end at the time when a real common understanding with the Pilot Project farmers was achieved and the BAP interventions should have been at the maximum. The farmers estimate that the Project should last at least two years in order to complete everything planned and to fully see positive effects both financially and in the opinion change among farmers about the storing and application of manure in a modern way.

10. COOPERATION WITH AUTHORITIES

10.1. Ministry of Agriculture, Forestry and Water Management

The Ministry of Agriculture, Forestry and Water Management had from the very beginning of the Project implementation insight into all activities and achievements of the Project. It provided great support and help in realization of the Project, especially in realization of terrain activities.

One way for distributing the BAP brochure was through the Ministry of Agriculture, Forestry and Water Management to the 35 local offices of the National Agriculture Advisory Service on the whole territory of Serbia. The Project got from the Ministry of Agriculture, Forestry and Water Management a Support Letter for Continuance of Danube Regional Project (see below) and many useful contacts in order to help to the project team organise the project follow-up.

MAFWM has shown interest for making a synergy with other complementary projects and also included distribution of the Project's BAP brochure within trainings which were organised in some regions of Central Serbia within so called Special projects. MAFWM expressed particularly large interest for the Project because small and medium farms were involved and a gap regarding these farms existed in the overall activities which Ministry so far launched with the WB Danube Project (Danube River Enterprise Pollution Reduction Project) where the target group is large farms and slaughterhouses.

Particularly interesting for MAFWM was also the fact that the activities of the Project were very good for identifying on-farm needs for interventions which lead to reduction of pollution, and not by imposing them from above, which helped farmers develop their own feeling about environmental actions as a contribution to better farm economy and not just experience. Of course, the Project was too short to make a large influence on more farms, so that was one of main comments the Ministry had. The Ministry is suggesting an extension of the Project (see recommendation letter below) which can help to disseminate the gained experience with the applied approach, particularly for the sake of better use of available grants for agro-environmental farm interventions. These kinds of grants are, due to lack of awareness and know-how on the farmers' side, presently not used enough (0.3% of the approved grants).

Translation from Serbian to English

REPUBLIC OF SERBIA

MINISTRY OF AGRICULTURE,

FORESTRY AND WATER MANAGEMENT

No. 337-00-237/2006-03

October 5, 2006

Nemanjina St. 22-26, Belgrade

RE: **Support Letter for Continuance of Dunav Regional Project**

Dear,

Ministries of Agriculture, Forestry and Water Management by this support the continuance of Dunav Regional Project for at least one year.

Dunav Regional Project: "Pollution Reduction through Changes of Agriculture Regulations and Demonstration in Pilot Program" has been financed by United Nations through its Agency for Development (UNDP). Project has been realized by Carl Bro Company from Denmark in the period from August 2005 to January 2007. Major activities of project have been realized in Serbia, in Vojvodina, on the territory of municipality Zrenjanin. Besides Serbia, the project includes Bosnia and Herzegovina, Croatia, Romania, Bulgaria, Ukraine and Moldavia. The project is the part of five-year UNDP/GEF project: Strengthening of Capacities for Reduction of Nutrients and Over Border Cooperation in Dunav basin.

Ministry of Agriculture has had from the beginning of project realization insight into all activities and accomplished results of the project. It has also provided great support and help in realization of project, especially in realization of terrain activities in Vojvodina.

This Project has been organized and realized as pilot project. Its basic goal has been reduction of pollution from agriculture by application of measures of Good Agriculture Practice. During the realization of project it has been obvious that the problem of soil and water pollution from agriculture has been very real and that all 15 promoted measures of Good Agriculture Practice would be very applicable and effective at this moment in Serbia. It is also obvious that this project has established great cooperation with Republic Ministry of Agriculture, Regional Secretariat for Agriculture, Local Agriculture Advice Service and other important institutions and individuals.

The unambiguous conclusion is that the further work on reduction of pollution from agriculture by application of measures of Good Agriculture Practice is justified and that excellent bases have been made for its successful continuance in the future. "Carl Bro" and project team from Serbia are very interested in continuing their successfully realized pilot project which may be spread on whole Serbia. Ministries of Agriculture, Forestry and Water Economy give completely support.

Sincerely,

State Secretary for Agriculture

Danilo Golubovic (sign.)

(seal)

I CERTIFY THAT THIS DOCUMENT HAS BEEN CORRECTLY TRANSLATED FROM SERBIAN INTO ENGLISH BY THE SWORN COURT INTERPRETER FOR THE ENGLISH LANGUAGE AT THE COUNTY COURT OF BELGRADE.

MY COMMISSION IS PERMANENT.

APPOINTED BY THE MINISTRY OF JUSTICE

10.2. Provincial Secretariat for Agriculture in Voivodina

Also the Provincial Secretariat for Agriculture in Vojvodina had from the very beginning of Project implementation insight into all activities and accomplished results of the Project. It provided technical support during the organization of the visit to the fair in Denmark. Also, it provided technical support to the project team regarding the pilot farmers' application for support from the Provincial Secretariat for Agriculture for manure storages and slurry spreading equipment. Also, those applications had support from all relevant Secretary Officials. Unfortunately, the final result of the contest was first postponed from July to November and finally the contest was cancelled without any explanation from the Provincial Secretariat for Agriculture. That is why the project team had to make a new plan in accordance with the new situation and with the fact that the winter was starting and that the Project was nearing its end. It is known that the department of the Secretariat responsible for the making and technical realisation of the competition, completed its job quite well. But another department was responsible for the evaluation and decision making. This point demonstrates the need for improved capacity within the Provincial Secretariat for Agriculture to finalise their actions successfully.

Issues like the non-stabilised political situation in Serbia and changes in administration, plus low capacity of existing systems to deal with support to rural development and agro-environmental measures are still hampering farmers to get the necessary support for their actions regarding reduction of pollution form agriculture. But it is on the other side obvious that further work with farmers is needed to be prepared and ready to respond to the opportunities for support measures which increasingly are offered.

11. COOPERATION WITH THE EXTENSION SERVICE

The definitions of Farm Advisory and Extension Services are given below:

Extension service: Dissemination of official information and legislation as well as scientific research and new knowledge to the farming community through mass communication, seminars or group advice. Typically organised as departments of ministries of agriculture or of agricultural universities.

Farm advisory service: Individual advice and services to farmers concerning analysis and planning of all aspects of their production. Typically related strongly to the legal requirements to farming, paid by the clients and organised as Non Government Organisation, commercial company or as affiliate of farmer organisations. Includes aspects covered by the extension services as well as group advice and training activities. Farm advisory work will relate to compliance with regulatory requirements and to good agricultural and environmental conditions. The system will operate on a voluntary basis.

The situation considering Agricultural Advisory and Extension Services is different from country to country in the Danube Basin countries. But for all the former communist countries in the basin the challenge is to transform the former communist Extension Services into Agricultural Advisory and Extension Services.

Therefore the Project considers to the conclusions of this chapter to be of relevance for all Danube Basin former communist countries.

11.1. Agricultural extension system in Serbia

The Serbian extension system consists of 34 agriculture stations which are mainly located in the centre of the county. Services are delivered by about 250 extension officers and their activity is financed from the budget of the Republic of Serbia through the Ministry of Agriculture, Forestry and Water Management and the Provincial Secretariat for Agriculture of Voivodina.

The extension services are provided free of charge for farmers. Basically agriculture stations are responsible for a variety of activities out of which most important are

- education of farmers through winter schools, media, booklets, leaflets etc.,
- provision of information to farmers on basis of phone calls,
- providing consultations to farmers that visit the agriculture stations,
- regular visits of extension officers to certain number of selected farms,
- collecting data on crops, harvest and farm economy,
- organisation of fairs, cattle exhibition and evaluation,
- demonstration of good practices and new varieties of crops etc.

Most of the services are connected to the primary production and production of animal feeds, but does not comprise issues as marketing, legal issues or economy aspects of production.

The extension officers are also collecting data for the marketing information system (STIPS) of the Ministry of Agriculture, Forestry and Water Management. As a support to the law on soils the extension service would also have to provide free of charge services to farmers like analysing their soils once per year for every farmer and also provide recommendations concerning calcification (the Ministry is also paying the material for calcification of acidic soils). However, the experience of the Project shows that it was difficult to motivate the farmers for sampling of their soils.

Extension officers and their institutions are eligible for grant schemes for novel trainings and transfer of knowledge from ministries and other authorities to extension officers and farmers. The Ministry is paying for such activities on a yearly basis. Calls for proposals are opened every year on the basis of decrees. The call has a particular line regarding reduction of pollution. Project proposals/applications can be submitted by

- agricultural stations,
- individual extension officers,
- NGOs,
- farmer associations,
- faculties,
- institutes.

The grants scheme is run by the Sector for Rural and Agriculture Development.

Similar grants are offered in 2006 for the first time through Phytosanitary and Veterinary Directorates but for their specific issues and tasks.

11.2. Extension services in the Pilot Project area

The Zrenjanin Agricultural Institute is part of the republican network of extension services, and is in the Voivodina region responsible for execution of extension activities. The institute has 12 extension officers covering agriculture production issues as mentioned above, and also running a soil analysis laboratory.

11.3. Cooperation between the local extension service and the Pilot Project

The Project got the first information about the local extension organisation from the Ministry of Agriculture, Forestry and Water Management. The initial contact with the Agricultural Institute from Zrenjanin was made after that. Few official meetings with the director and the managers of the Institute were held. From the very beginning they expressed their willingness for cooperation with the Project. Also, they agreed with the Project's experts about topics for future trainings. They expressed also their expectation regarding some financial support from the Project for improvement of its main activities.

The main reason for the Project to cooperate with the local extension service was qualitative improvement of its activities through on-the-job training about: nutrient balance calculation, field and fertiliser planning, plant protection planning and software for mentioned plans and calculations. Unfortunately this part of the cooperation was not successful.

Also, there were plans for presentation of practical experiences about models for organisation of farmers. This part of the cooperation with the Institute was successful and 14 members of its staff finished the training.

The main limitations for the Institute were additional expenditures. Its staff participated in all activities which were without additional expenditures: transportation, per diems etc. Serbian extension services are under reconstruction, with many unclear issues. That is why they are not ready to shoulder any additional costs in general.

11.4. Agreement with the local extension service

The cooperation between the Project and the local extension service, represented by the Zrenjanin Agricultural Institute (ZAI), was based on the following agreement. The agreement was signed by Zrenjanin Agricultural Institute and the Project in March 2006.

Agreement with Zrenjanin Agricultural Institute

The Project can offer

- **on-the-job training of 5-8 advisers in the following specialisms, including test and certification by project end**
    - **Nutrient balance calculations**
    - **Field and fertiliser planning**
    - **Plant protection**
    - **Milk recording and feeding planning for dairy cows**
    - **Organisation of farmers**
- **the ZAI can take over the use of the field and fertiliser plan programme the Project will develop;**
- **the ZAI can take over the use of the nutrient balance programme the Project will develop;**
- **the ZAI can take over the use of possible other sheets and computer models the Project will develop.**

The Project expects on the other hand that the ZAI and the involved advisers as part of their on-the-job training will perform the following:

- **Participate in nutrient balance calculations and do this for at least one farm independently.**
- **Undertake soil analysing and participate in soil sampling – the results of the soil analyses have to be ready until 1 March (if the soils are not frozen);**
- **Participate in the collection of information for field and fertiliser planning in connection with soil sampling;**
- **Carry out field and fertiliser planning for some of the farms according the instructions we give latest 1 March;**

- **Convert the pilot farms with cattle to monthly milk recording under the ZAI latest 1 May 2006;**
- **Participate in dairy cow feeding planning in autumn 2006 and carry out feeding planning for some of the farms according the instructions we give. Ensure update of monthly feed lists to all the dairy cattle farms in the period September 2006 to February 2007.**
- **Participate in the formulation of written agreements on establishing of joint machine cooperation.**

It is informed, that the trainees will be the following persons:

No	Name	Tel.	Specialisation
1			Nutrient balance calculations
2			Field and fertiliser planning
3			Cattle feeding and milk recording
4			Organisation of farmers

There can maximally be 2 trainees per subject.

Approved on _____ at _____

Signature:

11.5. Status/results

The cooperation agreement between the project and Zrenjanin Agricultural Institute was successful in all matters that dealt with the Projects delivery of training, material and software to the extension officers of the Institute. However, the involvement of the extension officers in the Pilot Project activities was not successful.

The extension officers of Zrenjanin Agricultural Institute could not be persuaded to go out in the fields and they seemingly prioritise office activities where the farmers come to them; and this did not comply with the activities the Project expected them to be involved in.

The project activities in the Pilot Project and the efforts to cooperate with the local extension service have, even though the cooperation was far from successful, had a kind of eye opening effect for the extension officers. The proposed project activities seem to have reached final acceptance of the importance of the issues, though not full devotion. The local extension officers seem to be overwhelmed by the variety of new obligations in different sectors.

Unfortunately the Project did not have the needed resources allocated to undertake the activities that were planned for the extension officers, and this would also not have been a sustainable solution which would provide for the anticipated dissemination effects.

11.6. Problems encountered/Progress needed

The Project prioritized the involvement of the local Serbian extension officers in the Pilot Project activities, but had to face that there was a gap between plans and results, as explained in the following.

Reporting forms for advisers (which farms they visited, when and for which purpose, what was discussed and recommended) have been elaborated by the Project. But the extension officers from the Zrenjanin Agricultural Institute did not visit farms and did not use the reporting forms in practice. The background for this is that the whole Serbian agricultural extension system is under reconstruction as a new law to regulate the area as well as privatization of the extension services are expected. It was not possible for the Project to persuade the extension officers from the Zrenjanin Agricultural Institute to visit the Pilot Project farms.

The Project followed-up on extension officers from Zrenjanin Agricultural Institute regarding their commitment to:

- do soil analysis,

- organise a workshop for animal feeding,

- to prepare nutrient balances as well as field and fertiliser planning for pilot farms.

The Project lacked the assistance of the advisers from Zrenjanin Agricultural Institute to the Pilot Project farmers. It was for instance agreed that, after the extension officers passed training for controlling spraying equipment and getting instruments for testing farmers' sprayers, they would visit all of the Pilot Project farms and do checking on the site as well as revising the plant protection plans of the individual farms. This planned activity was not completed and will remain for the next spring.

It was also not possible to transfer milk recording to the ZAI, since dairies are paid to do this. Transferring will bring expenses that no one will be able to cover. What was realized is that a milk recording system and connecting it with a farm advisory service is needed to provide more efficient delivery of advices for livestock farming, e.g. on dairy cow nutrition. However this transfer is only possible if a farm advisory system is established in Serbia (expected to happen in next few years). This restructuring is a large scale operation which is ongoing and is one target of the WB STAR Project (Serbian Transitional Agriculture Reform Project) which is supposed to help MAFWM to develop better environment for Serbian agriculture transition.

In order to have a really efficient transfer of knowledge to beneficiary farmers any cooperation between a Project and the advisory service has to be strongly supported and planned as obligatory within the MAFWM set of delegated advisory jobs. Advisory services are at the moment public but not part of the Ministry. Privatization of the agricultural advisory service will make ties to the MAFWM become even weaker, if the MAFWM misses to firmly define how to make its partners obliged to run certain agro-environmental programs and pay for this, since neither advisors nor farmers still completely understand the benefit from large investments in connection with the implementation of best agriculture practices.

Extension of the training program and training materials to the rest of the extension network of the Serbian Ministry of Agriculture, Forestry and Water Management is needed. Extension should also include the network of veterinary stations which were not involved in similar activities so far.

11.7. Lessons learned

It was not possible to involve Zrenjanin Agricultural Institute in face to face advisory activities to the Pilot Project farmers on their farms. There was by the Zrenjanin Agricultural Institute not provided any reason for the lack of involvement of the extension officers, neither any excuse. Probably the reasons are related with lines of command, lack of funds, priorisation of activities and the immanent restructuring of the extension services.

The Zrenjanin Agricultural Institute is working under auspices of the Ministry of Agriculture as well as Voivodina Agricultural Department, and we believe that we have had a positive interest from their side in the Project and that the Project is prioritised in their development programmes. There could have therefore been found an understanding with the Institute, if the matters were brought up for discussion.

Before a farm advisory service is established, any activity targeting the strengthening of the advisory service might fail. This will especially be the case if new activities create additional costs to the ZAI, as long as other institutes in the system are not ready to bear the additional costs.

11.8. Recommendations

The Project considers the recommendations below to be relevant for all former communist countries in the Danube Basin.

The BAPs require individual advice and services in order to be implemented, especially for BAPs dealing with nutrient balance calculations, field and fertiliser planning, feeding planning, and decisions related with crop protection. We have to recognise that extension services in general are not suited for these purposes. Their expertise is merely related with mass communication of messages from research institutions and authorities, here under writing articles, organising conferences and seminars, doing training, doing group advice, preparing leaflets etc. Extension services would typically deal with the individual farmer when it comes to assistance to apply for public subsidy programmes and alike.

An extension service would normally be willing to visit farms for on-the-job training. The consultant would therefore recommend that Serbia establishes a farm advisory service which can deal with calculations and planning for individual farmers in relation to Best Agricultural Practices. A number of the project ideas in chapter 15 are developed to comfort this, first of all project idea 15.10: "Capacity building for advisory services with respect to Best Agricultural Practices".

11.9. Future role of farm advisory services

The role of farm advisory services is very important for the successful implementation of agro-environmental policies. The European Commission has in connection with the reform of the Common Agricultural Policy (CAP) of 2003, as concretized in the regulation 1782/2003, decided to make it compulsory for the Member States to establish a Farm Advisory System (FAS) to assist farmers with the implementation of the Statutory Management Requirements (SMR) and the Good Agricultural and Environmental Conditions (GAECs), the so-called Cross Compliance (CC) requirements.

The SMRs and the GAECs are to a large extent dealing with agro-environmental issues – 35 out of 54 Cross Compliance requirements in Denmark in 2006 are dealing with agro-environmental matters that for the major part have overlap with the 15 BAPs defined in this Project.

Farm advisory services can help farmers with

- Individual advise mainly in connection with planning of their production, for instance preparation of nutrient balances or field and fertiliser plans, but also group advise and similar
- Information, here under guidance and instructions for performing of different operations, for instance how to design a manure store or how to feed cows in the summertime
- Training, which mainly contributes to awareness raising and changing of attitudes among farmers and also provides specific skills in for instance testing of field sprayers.

Nutrient balance calculations at the pilot farms have illustrated clearly that farmers' economic interests and the society's environmental interests go hand in hand a long part of the way. Farm advisory services are especially efficient tools to assist farmers as long as this is the matter (while further environmental practices must be enforced by legal enforcement).

Figures 7.5 to 7.8 in chapter 7: "Estimation of the impact of the 15 Pilot Project BAPs" illustrate in a convincing way with examples from Denmark how farm advisory services as primary instruments together with generally improved agricultural production methods have resulted in

> 40 % reduction in use of mineral fertiliser

> 50% reduction in use of pesticides

> while in the same period an increase of yields with 30%.

The Project has prioritised the involvement of Serbian extension officers in the Pilot Project activities, but we realised a gap between results and plans, as explained above, and it seems on this basis relevant to consider how the extension service can be strengthened, or, even better, if there could be established a farm advisory service in Serbia.

12. DISSEMINATION AND TRAINING ACTIVITIES

12.1. Project homepage

The project homepage (http://www.carlbrodrp.org.yu/) dedicated to the Pilot Project played a significant role in the Project's awareness raising campaign and dissemination activities. It was regularly up-dated and served as platform for communication with project partners and the agricultural and general society. It contains information on BAP (BAP brochure and BAP leaflet), the Pilot Project, project reports, downloads of the planning tools used in the implementation of the Pilot Project, information about media activities, a documentary film covering the implementation of the Pilot Project, a documentary film on construction of a manure pad, etc.

12.2. Activities in Serbia and by the project partners in the 7 lower Danube Countries

A range of dissemination and training activities (workshops, training events, awareness raising and media activities) were undertaken by the Project and the project partners in the 7 lower Danube countries. The activities are described in chapter 3.1.4: "Task 4: Dissemination of new Agricultural Pollution Reduction Concepts" and chapter 3.2.3: "Task 7: Pilot Project Training and Demonstration Workshops".

A comprehensive summary of all dissemination activities is available as separate file on the CD attached to this report ("List of training and dissemination activities").

12.3. Meetings with donors in Serbia and Serbian Authorities

Several meetings were arranged to inform potential international financing institutions and Serbian authorities about the achievements of the Project and the needs identified. The positive experiences with implementing BAP on pilot farms in Voijvodina were disseminated and the need to continue to introduce BAP to other areas and countries of the lower DRB was emphasized.

The need to continue was underlined by a support letter from the Serbian Ministry of Agriculture, Forestry and Water Management (see chapter 10: "Cooperation with authorities").

Most of the contacted parties expressed their interest in the Project, however, none did have the possibility to fund follow-up projects in the near future.

In the following a short list of the outcome of the meetings and contacts:

Institution	Contact person	Date	Comments
Embassy of Sweden	Mr. John-Olof Vinterhav, First	27 October 2006	The Swedish Ministry of Foreign Affairs will prepare a country

	Secretary (Environment and Infrastructure)		strategy for Serbia for the period 2008-2211. We were informed that SIDA agency has no more available funds for the year 2007, and there is small possibility for 2008.
OSCE mission in Belgrade	Mr. Dusan Vasiljevic, Head of Department for Economic and Environmental Affairs of the OSCE Mission in Serbia	27 October 2006	In the end of 2006, the OSCE Mission in Serbia makes a general plan for next year. The final plan for activities and budget for next year will be finished early in 2007. Our project ideas are convenient for the OSCE Mission in Serbia.
UNDP country office	Mr. Aleksandar Macura, Project Manager in the UNDP Country Office	27 October 2006	Mr. Macura was very interested in our project, results and possible extension of the Project. Also, from his point of view it is good time for new project initiatives for next year, as UNDP Country Office presently creates plans for next year.
Embassy of Israel		20 November 2006	The Israeli embassy can offer only training programs in Israel.
Embassy of the Netherlands	Mr. Oscar Meuffels	21 November 2006	Additional to our contact the Ministry of Agriculture had a meeting with a Dutch delegation in November. The Ministry of Agriculture informed the delegation about the Project and about the Ministry's support for the extension of the Project.
JICA (Japanese International Cooperation Agency		22 November 2006	Funding initiatives for projects in Serbia are still under development.
Embassy of Spain, Economy Department		22 November 2006	The Economy Department of the Spanish Embassy expressed interest in the Project. Within a project frame it might be possible for Serbian farmers to get credits from Spanish agricultural equipment companies to realize interventions in Serbian

			agriculture.
Embassies of Finland, Austria, Switzerland, Finland		November 2006	No funding possibilities
Serbian Ministry for International Economic Relations		20 November 2006	Can provide information about embassies and their grants programs

12.4. Conference in Ukraine on problems and prospects of agricultural production

On behalf of the Project and DAAS the International Pilot Project Expert of the Project presented the Project on the conference: «Problems and Prospects of Agricultural Production, Food Safety and Quality Competitiveness Raising in Ukraine. Role of Agricultural Advisory» October 25-27, 2006 in Kyiv.

The presentation of the Project included the following:

- Opening address

- Experience of EU countries in implementation of Good Agricultural Practice (GAP) system and organic farming

- Best Agricultural Practice (BAP): UNDP/GEF "Reduction of pollution releases through agricultural policy change and demonstrations by Pilot Projects " experience.

13. REPLICATION POTENTIAL

The Project considers the 15 BAPs relevant for all lower Danube countries - they are universal for agriculture with livestock production, most in general, some only in a temperate climate (for further information, see chapter 6: "Applicability and relevance of Pilot Project BAPs for all lower Danube countries"). Each region needs to develop their own CoGAPs taking offspring in these BAPs and adding codes relevant for the local conditions or underpinning different issues, for instance hill farming, etc.

The results of the Pilot Project are applicable and of great relevance for all lower Danube countries and have been included and used in the Pilot Project training of the project partners (see for example the homepage of National Association of Agricultural Advisory Services of Ukraine: http://www.dorada.org.ua/bap/).

13.1. Pilot Projects

On the workshop for representatives of all project partners from the 7 lower Danube countries from 20-23 February 2006, it was stressed by the project partners that similar BAP pilot projects are urgently needed in the 6 other lower Danube countries, to show in practice how to implement BAP in a way that corresponds to the local conditions, and to demonstrate the benefits of BAP implementation for both the environment and the farm economy.

Experience from the Pilot Project shows that at least 2½ years and preferably 3 years are needed to implement a pilot project and related training activities:

- 6 months are needed to identify farmers, set up the detailed project and implementation plan in close dialogue with farmers. The experiences show that it takes several meetings, discussions and examples relating to their own farms before the farmers get acquainted with the BAP-approach.
- one year for the first adaptations to the BAPs on the Pilot Project farms: to build manure storages, take soil samples, make field and fertiliser planning, buy equipment for manure spreading, facilitate farmer cooperation etc.
- one year for follow up activities on the above mentioned issues and for training activities.

13.2. Cooperation with farmers and agricultural authorities

The experiences from cooperation with the Pilot Project farmers have been very positive. The same positive approach has been experienced form the authorities Ministry of Agriculture, Forestry and Water Management and Provincial Secretariat for Agriculture in Voivodina although the applications from the Pilot Project farmers for support from the Provincial Secretariat for Agriculture in Voivodina were not successful as the whole application procedure was cancelled in the end.

The cooperation with the Zrenjanin Agricultural Institute did not fulfil the expectations of the Project and the written agreement with the Institute. The staff of the Institute did not participate in the practical activities on the Pilot Project farms as they did not find any incentives for the participation, and they are used to another way of working. When cooperating with and making on-the-job-training for an agricultural extension/advisory service, cooperation should be based on an analysis of the present tasks and financing of the advisors work. Further it has to be assured that the individual expert/advisor has incentives to work together with the Project and realises these interests.

13.3. Standards and software

One of the main experiences of the Project is the need for countrywide standards:

1. Soil classification
2. Fertiliser norms
3. Manure standards
4. Standards for construction of manure storages addressing local situation and handling of manure in the stables.

Further tools are needed e.g.:

1. Software for field and fertiliser planning
2. Software for nutrient balance calculation
3. Software for planning of cattle feeding.
4. Software for planning of pig feeding.

These needs are as far as the Project is informed also found in the other 7 lower Danube countries.

13.4. Inspection

Another of the main experiences of the Project is the need for a functioning inspection system. Urgent issues for inspection related to the Pilot Project are:

1. Inspection of farms regarding storage for manure
2. Control of the quality of chemical fertiliser, feedstuff etc. according legislation.

The need for an upgrade of the inspection and enforcement is as far as the Project is informed also found in the other 7 lower Danube countries.

13.5. Benefits for farmers of BAP

Stressing the economic advantages of BAP implementation to the Pilot Project farmers has been the central element in the project approach.

The Project is convinced that there will be no real progress in the environmental performance (which can be documented by environmental monitoring in terms of reduction of the level of nutrients and pesticides in surface and groundwater) if the farmers and the agricultural society in general do not feel ownership to the concept of BAP and its implementation.

The interest and positive attidude among the Pilot Project farmers is by the Project considered as a proof that this approach is successful.

Dissemination of the approach and awareness raising are needed to achieve ownership to BAP implementation among farmers in general. The dissemination and awareness activities are greatly supported if practical positive examples, like e.g. achieved by pilot projects, are available for demonstration for farmers.

14. FOLLOW UP PROJECTS – PROJECT IDEAS

To facilitate and target future donor assistance to improve the environmental performance of agriculture, the Project presents in this section 12 project ideas for follow up projects that are suited to be implemented as donor financed projects.

The background for the project ideas is the following

- identified gaps (e.g.: need for manure standards, farm advisory service)

- too short time to implement the Pilot Project and the Pilot Project training and dissemination – at least 2½, preferably 3½ year are needed

- more efforts are needed to disseminate information on BAP and create awareness on the impact of agriculture on environment.

The proposed projects are:

No	Project Idea	Country	Comments
1	**Extension of the Pilot Project**	**Serbia**	**1 year and three months is too short time for the implementation of a pilot project and related training. At least 2½ year and preferably 3½ years are needed. Pilot Project farmers have confirmed their interest in a continuation of the cooperation.**
2	**Similar pilot projects in other areas of Serbia**	**Serbia**	**Serbia has different natural conditions and different types of farming, and also due to distances (demonstration of BAP on pilot project farms), dissemination of BAP and awareness raising pilot project farms are needed in other areas of Serbia.**
3	**Demonstration farms**	**7 lower Danube countries**	**There is a very big potential of pilot project farms for spreading the concepts of BAP and creating awareness on the impact of agriculture on environment and how BAP can mitigate this impact.**
4	**Training in BAP in other areas of Serbia based on the Pilot Project results**	**Serbia**	**Further training and awareness raising on the impact of agriculture on environment and how BAP can mitigate this impact based upon the experiences from the Pilot Project would be of big value.**
5	**Training in BAP in lower Danube countries based on the Pilot Project results**	**7 lower Danube countries**	
6	**Farmer cooperation: manure storage & spreading, machinery rings, village**	**Serbia**	**Farmer cooperation on BAP is of great value for the exchange of experience and to reduce the investment for manure storages and**

	cooperation		**equipment for bring out manure for the individual farmer.**
7	**Fertiliser norms and Manure standards for all lower Danube countries**	**7 lower Danube countries**	**To implement BAP fertiliser norms and manure standards in line with EU legislation are crucial, and these norms should be included in the legislation.**
8	**Reduction of the nitrogen and phosphorus load on the environment through better livestock feeding practices**	**7 lower Danube countries**	**Averagely 70% of nitrogen and phosphorus used in the feeding of livestock ends in the nature rather than in the products, but with big variations. There is big potential to improve the efficiency of feeding and at the same time reduce pollution.**
9	**Pesticides, certificate for spraying and checking of equipment**	**7 lower Danube countries**	**Experiences from the Pilot Project farms show that the equipment for spraying of pesticides is in a very bad condition. Further training and certification of farmers using pesticides are urgently needed.**
10	**Capacity building of advisory services with respect to Best Agricultural Practices**	**7 lower Danube countries**	**Agricultural Advisory Services where services shall be driven by user demand are available for farmers in some but not all of the 7 lower Danube countries. Establishment and training in BAP of Agricultural Advisory Services are of crucial importance for BAP implementation.**
11	**Further awareness raising and dissemination activities**	**7 lower Danube countries**	**Awareness raising and dissemination activities promoting BAP are needed in all the 7 lower Danube countries.**
12	**Policy formulation and drafting of agro-environmental legislation**	**7 lower Danube countries**	**New legislation is needed based upon the agro-environmental status in the countries and EU policies within the agro-environmental area.**

14.1. Extension of the Pilot Project

Title	Consolidation and dissemination of Pilot Project activities of Best Agricultural Practices (BAP)
Background	There is a need to continue the very successful Pilot Project activities in the UNDP/GEF DRP Pilot Project in order to build on the momentum achieved, and to gain practical experience from implementation of the 15 BAPs which are of great value for the minimising of the loss of nutrients and pesticides in the Danube Basin. Nitrogen and phosphorus from agricultural livestock production and plant protection products are not only potential hazardous agents for the aquatic

	environment, they are also very valuable inputs in agricultural production. A number of Best Agricultural Practices (BAP) that were expected to have a strong effect on improving farm economy as well as on minimizing environmental pollution were introduced to the Lower Danube Basin countries in the framework of the UNDP-GEF DRP project in 2006. The BAP were implemented in a Pilot Project consisting of 8 family farms in the Vojvodina region in Serbia. Central elements of the implemented BAP are: increase of slurry storage capacity, improvement of slurry application with respect to optimizing its nutrient value and minimizing its pollution effects, safe storage and handling of pesticides. Supporting farmers in application for funds for construction of manure tanks from official support schemes in line with the EU Nitrates Directive and building of one manure pad were part of the Project. The results and experiences from the Pilot Project are a valuable basis for the introduction of BAP in other areas of the DRB. The Pilot Project farms could serve as demonstration farms after consolidation of some of the initiated changes and wider introduction of the Projects adviser tools to the farming community and to agricultural experts. The farmers expressed their interest in continuing the Project regarding: - finalization of the financial support for building modern manure storages and procurement of equipment for manure applying - optimizing of crop production (from an environmental and economic point of view) - exchange of practical experience on farmer-farmer and farmer-expert (lecturer) basis - promotion of the usage of slurry and green manure for the benefit of the environment and the farm economy - nutrition and fertilizing planning in the light of current prices of farm inputs and outputs to minimize loss of nutrients - practical demonstration of the effects of timely and proper fertilizing on farmers' pilot fields over one season and demonstration of new equipment and technology for application of manure and slurry.
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and pesticides from agriculture is minimized by efficient use and recirculation of farm inputs.
Specific objective	The Pilot Project established during the DRP-UNDP/GEF Project in 2006 is consolidated and the positive results and experiences from the implementation of BAP on 8 family farms in Vojvodina are disseminated to other farming communities and agricultural advisers in Serbia and the other 6 lower Danube countries to encourage replication.
Results	• At least manure storages for 2 of the Pilot Project farms are completed and used for demonstration purposes. • At least 1 machinery ring for manure spreading equipment is established in the Pilot Project area. • The effect of timely and proper fertilizing using manure and slurry (based on the manure pad already established) over one cropping season is demonstrated on the fields of the farmer in question to farmers and

	agricultural advisors. • Agricultural experts of Zrenjanian Agricultural Institute are trained in BAP and face to face advice to farmers. • Farmers are trained in BAP using farms of the Pilot Project and demonstration fields in the training • Project results are disseminated to decision makers and representatives of the agricultural societies from Serbia and the other 6 lower Danube countries	
Short description of proposed activities	Activities for Pilot Project farmers: • Build manure storages (preferably one storage for several farms): agreements with farmers, calculation of necessary capacity, technical design of storage, application to authorities for building permission and financial support from financial government schemes, supplementary support if necessary, building instructions. • Establish machinery rings for spreading manure • Establish cropping plan and fertilizing plan for demonstration fields • Establish demonstration fields on Pilot Project farm • Train farmers in BAP based on Pilot Project demonstration farm • Arrange study tour for Pilot Project farmers and advisors to farms in EU country to demonstrate efficient manure handling and field and fertilizer planning, livestock feeding, role and work of advisory services etc. Other activities: • Prepare training and dissemination material for agricultural experts/advisors • Train agricultural advisors in BAP, how to support farmers to implement BAP and how to use BAP demonstration farms for farmers training • Train agricultural experts/advisors from ZAI on face to face advice to farmers • Disseminate Pilot Project results through activities for farmers and advisory services from the lower Danube countries (seminar/workshop for advisors/experts from the countries incl. on site visit) • Disseminate Pilot Project results via media, Project homepage and elaboration BAP brochure to be placed on the Project homepage presenting the results of the Project in the languages of all 7 lower DRB countries	
Duration	24 months	
Input	Input needed to implement the activities, man months and Euro	
	Team Leader (impact of agricultural practices, dissemination)	6
	Local Team Leader (impact of agricultural practices, ongoing contact with the Pilot project farmers, facilitate cooperation with project partners)	21
	Expatriate awareness/dissemination expert	3

	Local awareness/dissemination expert	6
	Expatriate BAP expert	7
	Local BAP expert(s)	21
	Pool of exp. experts for ad-hoc inputs on specific issues (e.g. norms, standards, legislation, construction of manure storages)	4
	Pool of local experts for ad-hoc inputs on specific issues (e.g. norms, standards, legislation, agricultural building/ construction of manure storages)	10
	Total, man months:	78
	Total, fee EUR (incl. travel and accommodation):	635,000
	Local logistics, secretarial, language support and office running, EUR	115,000
	Support for investments (to supplement grants from national and regional authorities) seminars, workshops etc. and for inclusion of experts of ZAI in the project, EUR	50,000
	Total, budget EUR:	800,000
Linked with other project ideas	Other project ideas which can be merged with this project idea: 2. Similar pilot projects in other areas of Serbia 3. Demonstration farms (all 7 countries) 4. Training in BAP in other areas of Serbia based on the results 5. Training in BAP in lower Danube countries based on the Pilot Project results 6. Farmer cooperation: manure storage & spreading, machinery rings, village cooperation 7. Fertilizer norms and Manure standards for all lower Danube countries 8. Reduction of the load of nitrogen and phosphorus on the environment through better livestock feeding practices 9. Pesticides, certificate for spraying and checking of equipment 10. Capacity building of advisory services with respect to Best Agricultural Practices 11. Further awareness raising and dissemination activities 12. Policy formulation and drafting of agro-environmental legislation	
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14.2. Similar pilot projects in other areas of Serbia

Title	Introduction and dissemination Best Agricultural Practice in Serbia through establishment of 5 pilot projects in Serbia
Background	To support national agricultural pollution control policies in the lower DRB countries a concept for Best Agricultural Practice describing farm management practices that reduce the risk for pollution from agricultural non-point sources was developed during the UNDP GEF Danube Regional Project. The described Best Agricultural Practices were implemented in a Pilot Project on 8 family farms in the Vojvodina region in the frame of Danube Regional Project in 2006 with good results. The Pilot Project farms can now be used for demonstration purposes and as source for inspiration for farmers and agricultural advisors interested in BAP. Agricultural structure and practices in other regions of Serbia are quite different from Vojvodina and require the adoption of the results and experiences of the Pilot Project to local and traditional circumstances. Particularly areas with a lot of small farmers (80% of farmers' population in Serbia) contribute extremely to the pollution because of traditional bad practices. They are contributing extremely to pollution of small water courses and ground water, as well as to devastated landscapes. Establishing similar BAP pilot projects in other regions of Serbia would extend the introduction of BAP from the very productive Vojvodina region to other typical Serbian farming types and provide examples for environmental safe and economically sound agricultural production also in these areas. Locally adapted pilot farms can be used for training and dissemination purposes later-on. Results (adviser tools, BAP brochure, media promotion of BAP, machinery ring, etc.) and experiences from the established Pilot Project in Vojvodina need to be consolidated and disseminated to the advisory system and farmers country wide. There is further a need to assess farm status, financial capacity, farmers' knowledge on optimizing fertiliser use (incl. manure) and minimizing use of pesticides of more farms. Measuring the economic and environmental impact of introducing BAP into daily farming would provide valuable locally applicable information that could be used to justify future operations.
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and PPPs from agriculture is minimized by efficient use and recirculation of farm inputs.
Specific objective	The BAP concept successfully implemented in the Vojvodina Pilot Project (adviser tools, BAP brochure, media promotion of BAP, machinery ring, etc.) is introduced country wide.
Results	• 5 typical rural areas of the Serbian Danube watershed (high water plot area, nature protected area, water protected zone area, suburban area, intensive fertile agriculture area or similar.) are identified for pilot projects and BAP implemented on pilot project farms. • Standards for manure storage in typical areas and for areas of special interest (nature protected areas, water protection zones, tourist areas) are developed and BAP guidelines adapted to local conditions.

	• Financing schemes for manure storage for at least 3 pilot farms in each region are secured. • Relevant information on future EU rules regarding agriculture and on possibilities for financial support for farmers are assessed and disseminated to local authorities, advisory service and farmers. • Farmers participating in pilot projects and agricultural advisors are trained in BAP. • BAP and experiences from pilot projects are presented and disseminated to other farmers, the advisory system and the general public with involvement of local authorities.	
Short description of proposed activities	• Identify 5 rural areas representing typical agricultural structures and water vulnerability situations. • Identify pilot project farms in pilot areas and make agreements with farmers. • Train farmers and advisor in pilot project areas. • Present saving environment-saving money concept. • Prepare standards for manure storage. • Do systematical assessment of needs for interventions. • Prepare financial budget for need farm equipment/storage facilities and secure financial support. • Establish forum and system for communication for relevant information for farmers regarding financial support for farmers. • Establish panel of producers of equipment for managing farm manure, agricultural advisory service and farmers. • Disseminate BAP and pilot project experiences to other farmers, the advisory system and the general public.	
Duration	30 months	
Input	Expert inputs (man months):	
	Team Leader (impact of agricultural practices, dissemination)	12
	Local Team Leader (impact of agricultural practices, ongoing contact with the pilot project farmers, facilitate cooperation with project partners)	26
	Expatriate awareness/dissemination expert	3
	Local awareness/dissemination expert	6
	Expatriate BAP expert	10
	Local BAP expert	26
	Pool of exp. experts for ad-hoc inputs on specific issues (e.g. norms, standards, legislation)	10
	Pool of local experts for ad-hoc inputs on specific issues (e.g. norms, standards, legislation, buildings)	12
	Total, man months:	105
	Total, fee EUR (incl. travel and accommodation):	845,000
	Local logistics, secretarial, language support and office running, EUR	140,000

	Support for investments (to supplement grants from national and regional authorities), EUR	150,000
	Total, budget EUR:	1,135,000
Linked with other project ideas	Other project ideas witch can be merged with this project idea: 1. Extension of the Pilot Project 3. Demonstration farms (all 7 countries) 4. Training in BAP in other areas of Serbia based on the Pilot Project results 5. Training in BAP in lower Danube countries based on the Pilot Project results 6. Farmer cooperation: manure storage & spreading, machinery rings, village cooperation 7. Fertiliser norms and Manure standards for all lower Danube countries 8. Reduction of the load of nitrogen and phosphorus on the environment through better livestock feeding practices 9. Pesticides, certificate for spraying and checking of equipment 10. Capacity building of advisory services with respect to Best Agricultural Practices 11. Further awareness raising and dissemination activities 12. Policy formulation and drafting of agro-environmental legislation	
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14.3. Demonstration farms (all 7 countries)

Title	Introduction and dissemination Best Agricultural Practice in 7 lower Danube River basin countries through establishment of pilot projects
Background	To support national agricultural pollution control policies in the lower DRB countries a concept for Best Agricultural Practice describing farm management practices that reduce the risk for pollution from agricultural non-point sources was developed during the UNDP GEF Danube Regional Project. The described Best Agricultural Practices were implemented in a Pilot Project on 8 family farms in the Vojvodina region, Serbia, in the frame of Danube Regional Project in 2006 with good results. The Pilot Project farms can now be used for demonstration purposes and as source for inspiration for farmers and agricultural advisors interested in BAP. Agricultural structure and practices in other countries of the lower Danube River Basin are quite different from Vojvodina, Serbia, and require the adoption of the results and experiences of the Pilot Project to local and traditional circumstances. Establishing similar pilot projects in countries of the lower DRB would be of great value for improving the environmental and economic performance of agriculture particularly regarding nutrients and pesticides. Locally adapted pilot farms can be used for training and dissemination purposes later-on.
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and PPPs from agriculture is minimized by efficient use and recirculation of farm inputs.
Specific objective	The BAP concept is adapted to local conditions and introduced in pilot projects all 7 lower DRB countries with the use of investment support from official agri-environmental schemes.
Results	• BAP is implemented in 5 pilot projects representing different farm types (e.g. medium pig, cattle, poultry, small mixed traditional farms, organic mixed farms and large pig and cattle farms) in each country. • Farmers and advisors in the pilot project areas are trained in BAP. • The capacity of the local advisory services to advice on new rules and possibilities to seek financial support is increased. • Available funds from agri-environmental schemes of the government are used by the farmers for improvements regarding livestock manure storage and use. • Cross-border environmental cooperation and communication is strengthened and experiences from of the pilot projects are exchanged between the countries.
Short description of proposed	In total 35 pilot projects will be established in different typical environments and farming situations in the 7 lower DRB countries to demonstrate Best Agricultural Practice. Through matching funds and know-how from the Pilot Project in Serbia, the governments and farmers will contribute to building a unique reality show for farmers in the region, who often find it very difficult to understand agro-

activities	environmental interventions on private farms. Pilot farms will be developed out of selected typical farms in typical types of environment. Through transfer of knowledge pilot farmers will make improvements in economic and environmental production, using proper equipment and improving storage and management of farm manure, etc. Teams of advisors will be accompanied by extension workers in their respective areas to act as intervention groups for doing assessment of needs, projecting activities and conducting improvements in the first project phase. Through open door arrangements and other dissemination materials and activities farmers, advisors, policy makers, governmental designers of financial support schemes and the general public will be made aware of the concept of BAP.	
Duration	30 months	
Input	Expert inputs (man months):	
	Team Leader (impact of agricultural practices, dissemination)	25
	Local Team Leaders for each country (impact of agricultural practices, ongoing contact with the pilot project farmers, facilitate cooperation with project partners)	140
	Expatriate awareness/dissemination expert	3
	Awareness/dissemination experts for 7 countries	35
	Expatriate BAP expert	21
	Local BAP experts	42
	Pool of exp. experts for ad-hoc inputs on specific issues (e.g. norms, standards, legislation)	12
	Pool of local experts for ad-hoc inputs on specific issues (e.g. norms, standards, legislation, buildings)	21
	Total, man months:	299
	Total, fee EUR (incl. travel and accommodation):	2,025,000
	Local logistics, secretarial, language support and office running, EUR	150,000
	Support for investments (to supplement grants from national and regional authorities), workshops etc., EUR	350,000
	Total budget EUR:	2,525,000
Linked with other project ideas	Other project ideas which can be merged with this project idea: 1. Extension of the Pilot Project 2. Similar pilot projects in other areas of Serbia 5. Training in BAP in lower Danube countries based on the Pilot Project results 6. Farmer cooperation: manure storage & spreading, machinery rings, village cooperation 7. Fertiliser norms and Manure standards for all lower Danube countries 8. Reduction of the load of nitrogen and phosphorus on the environment through better livestock feeding practices	

	9. Pesticides, certificate for spraying and checking of equipment 10. Capacity building of advisory services with respect to Best Agricultural Practices 11. Further awareness raising and dissemination activities 12. Policy formulation and drafting of agro-environmental legislation
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14.4. Training in BAP in other areas of Serbia based on the Pilot Project results

Title	Training in BAP in other areas of Serbia based on the Pilot Project results
Background	Best Agricultural Practices were established on 8 family farms in the Vojvodina region within the frame of the UN DRP Project in 2006. The results and experiences from the Pilot Project are a valuable basis for the introduction of BAP in other areas of the Serbia. The need to be better consolidated and more widely known to especially the farming community and agricultural experts. Training in BAP in other areas of Serbia based on the Pilot Project results is needed to: - Optimize crop production environmentally and economically - Exchange practical experience on farmer-farmer and farmer-expert (lecturer) basis - Promote the usage of slurry and green manure as valuable farm inputs and at the same time to reduce pollution of the environment through agriculture - Improve fertiliser planning in the light of current prices of farm inputs and outputs to optimize farm economy and minimize loss of nutrients - Present new equipment and technology for improved application of manure and slurry. - Practically demonstrate the effects of timely and proper fertilizing on farmers' pilot fields over one season.
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and PPPs from agriculture is minimized by efficient use and recirculation of farm inputs.

Specific objective	The concept of BAP and the experiences from the Pilot Project in Vojvodina is extended to other parts of Serbia.
Background	The agriculture situation in Serbia is in a very bad condition, which results in environmental pollution of the many river sheds passing through Serbian agriculture regions. Trainings on implementation of BAP and awareness raising on environmental concern would improve environmentally safe and economically sound agriculture practice. Farmers and their advisors need a logistical support for BAP practices, supported by adequate campaign products. Experience from the training courses in Vojvodina (primarily farmers from 8 pilot farms and representatives from the local advisory and extension service involved in the Project) shows a very positive accept from the farmers' side. The potential for improving the environmental performance of Serbian farms through training in the implementation of BAP seems to be great. The agricultural situation regarding farm economy and pollution from agriculture is much worse in Central and South Serbia compared to the Vojvodina region where the Pilot Project took place. This is because especially the traditional agriculture is much more common there and some of the traditional practices cause tremendous environmental deterioration around the farms (groundwater etc.) and in the river basins. So the necessity for improvement of agricultural practice in these regions is very high. An increase of the number of trained farmers and representatives from other local advisory and extension services is expected to improve economically and environmentally safe agricultural production. Parallel information campaigns will further raise awareness on the issue of agricultural pollution.
Results	The project will for each Serbian agriculture region have the following results: • Farmers and extension staff have increased knowledge on BAP implementation and adjustment. • The extension staff is educated to instruct farmers appropriately. • Guidelines for training courses on BAP principles are developed. • At least 10 demonstration farms are established and used for on-farm demonstrations. • Extension and advisory services are networking and exchange experience on BAP practice implementation. • Module for environmental journalism education on BAP introduction in Serbian agriculture is developed using pilot project approach. • Awareness on BAP is raised in media and general public (newsletter on BAP, media coverage of the best demonstration farms and regions of BAP implementation)

Short description of proposed activities	The activities should comprise: • Organise trainings for farmers and agricultural advisers in the 10 different municipalities in Serbia • Organise a workshop for extension service (covering 10 of the 34 registered in Serbia) • Prepare detailed guidelines dedicated to BAP principles and its practical implementation • Establish demonstration farms in each of 10 Municipalities • Establish a network of advisory service and extension service staff for BAP promotion • Organise a seminar for journalists on the topic "Environmental Journalism" • Initiate and support a monthly Newsletter covering all results and successes	
Duration	24 months	
Input	Expert inputs (man months):	
	Expatriate team leader	12
	Expatriate experts in BAP	10
	Three national project coordinators (full time employed), local team leader, agriculture expert and media and dissemination activities expert, each 21 man-months	63
	Short term input of local experts and scientists	30
	Total, man months:	115
	Total, fee EUR (incl. travel and accommodation):	1,015,000
	Local logistics, secretarial, language support and office running, EUR	135,000
	Equipment for BAP agriculture activities, EUR	50,000
	Costs for dissemination and training activities, workshops, seminars etc., EUR	20,000
	Total, budget EUR:	1,220,000
Linked with other project ideas	This project proposal could be implemented together with proposals no. 5 (Training in the Lower Danube countries based on the Pilot Project Results) as transfer of knowledge and experience should continue also in the mentioned regions and no.10 (Capacity building of Advisory services with respect to Best Agriculture Practices) as the extension and advisory service as one of two training target groups should provide the sustainability of the project (long term effect).	
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14.5. Training in BAP in lower Danube countries based on the Pilot Project results

Title	Training in BAP in Lower Danube Countries based on the Pilot Project results
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and PPPs from agriculture is minimized by efficient use and recirculation of farm inputs.
Specific objective	The concept of BAP and the experiences from the Pilot Project in Vojvodina are extended to the lower Danube River Basin countries (Serbia, Bosnia, Croatia, Romania, Bulgaria, Moldova and Ukraine) and the knowledge on BAP is disseminated to farmers and the advisory and the extension services.
Background	As the Lower Danube Region Countries have a lack of implemented environmental legislation, bad infrastructure in rural areas and are still practicing traditional and intensive agriculture, the environmental pollution of the Danube River Basin from agriculture is huge. In the first phase of the Project, only Serbia had the opportunity to establish pilot farms, where BAP practices were implemented. The results obtained in this Pilot Project showed the great value of the trainings on BAP. Workshops and study tours on the international level have been organized only twice. To strengthen the knowledge on BAP in all 7 Lower Danube countries it is necessary to conduct further trainings and to establish pilot farms in each of them. It should be underlined that the biggest pollution of the Danube River Basin is actually deriving from the lower Danube region. Further improvement of the agriculture situation is needed, which could be supported by trainings in Best Agricultural Practice. The beneficiaries of the project would also include public institutions like Agriculture and Environmental Ministries and Agriculture Institutes to ensure the dissemination of the BAP knowledge and practice.
Results	• The extension staff educated in all 7 lower DRB countries to instruct farmers appropriately on the principles of BAP • Guidelines for training courses on BAP principles developed and translated in each language of the seven countries • Pilot/Demonstration farms are established and used for on-farm demonstrations in each of the countries • Extension and advisory services are networking and exchange experience on BAP practice implementation on national and international level • Module for environmental journalism education on BAP introduction is developed for each country using pilot project approach and used in seminars for environmental journalists conducted in order to support BAP

	• Newsletter on BAP initiated and distributed in all 7 Lower Danube River Basin countries • Workshops and consultation meetings conducted and respective materials prepared • Common platform for a transboundary communication on BAP practice established • Guidelines for training courses on BAP principles are developed. • Awareness on BAP is raised in media and general public (newsletter on BAP, media coverage of pilot farms etc.)	
Short description of proposed activities	The activities should comprise: • Organize trainings for extension and advisory services in 7 Lower Danube Countries on BAP using pilot farms for demonstration • Prepare BAP Guidelines for all countries • Establish pilot farms in each of the 7 countries • Establish a network of advisory service and extension service staff for BAP promotion • Support advisory and extension service in networking on BAP dissemination activities on national and international level • Organize a seminar for journalists on the topic "Environmental Journalism" • Initiate and support a monthly Newsletter covering all results and successes in all 7 lower Danube countries • Organize workshops and consultation meetings for dissemination of BAP principles and prepare respective materials	
Duration	18 months	
Input	Expert inputs (man months):	
	Expatriate team leader	12
	Local team leader	15
	Expatriate experts in BAP	14
	Six national project coordinators, each 10 man-months	60
	Seven national media and dissemination activities expert, each 5 man-months	35
	Short term input of local experts and scientists	30
	Total, man months:	166

	Total, fee EUR (incl. travel and accommodation):	920,000
	Local logistics, secretarial, language support and office running, EUR	125,000
	Equipment for BAP agriculture activities, EUR	50,000
	Costs for dissemination and training activities, workshops, seminars etc., EUR	20,000
	Total, budget EUR:	1,115,000
Linked with other project ideas	This project proposal could be implemented together with proposals no. 4. (Training in Serbia based on the Pilot Project Results) as transboundary communication should be increased and no. 11 as public awareness about environmental protection and BAP as a mechanism to achieve it, could be highly supported by media and effective campaign.	
Contact persons	Jesper Ansbæk, Project Manager, Grontmij | Carl Bro A/S, jesper.ansbaek@grontmij-carlbro.dk, Phone: +4543486577 Henning Lyngsø Foged, Danish Agricultural Advisory Service, hlf@landscentret.dk Mob. +45 4034 8625, Tel. +45 8740 5105	

14.6. Farmer cooperation: manure storage & spreading, machinery rings, village cooperation

Title	Farmer cooperation: manure storage & spreading, machinery rings, village cooperation
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and PPPs from agriculture is minimized by efficient use and recirculation of farm inputs.
Specific objective	Economically and environmentally sound storage and spreading of farm manure secured through the cooperation of farmers in manure storage and machinery rings.
Background	The mixed faming system predominates in Serbia, but there are also big livestock and crop farms. In both cases insufficient machinery, infrastructure and knowledge cause big loses in terms of production, but also cause environmental pollution. Lack of finances to buy proper farm equipment, supported by the negative stereotype of cooperatives or farmer's groups, is a major problem to be solved in Serbian countryside in order to improve economically and environmentally sound farm production. To set up partnership arrangements between farmers might be a way to secure

	the environmental performance and of cooperating farms as well as to increase their economic profitability. Collaboration between dairy farms and crop farmers is to be in focus of the objective, together with mixed farm system cooperation. Co-operation could improve crop rotation and diversification when the collaboration also involves machinery and infrastructure (manure storage and spreading). Gains from collaboration originate from biological and technical factors, such as improved growth of the crops due to better utilization of manure through e.g. improved manure storage facilities and spreading, which in turn reduces environmental contamination by agriculture. Serbia is well-known as a country of rich tradition of cooperative movement. Real cooperative organizations appeared in towns already in the 1870ies. After the second world war, the programme of state agriculture cooperatives forced the individual farmers to join cooperatives and give the majority of their land, their machinery and products to the cooperatives for common use. This caused a negative stereotype about cooperatives which even exists nowadays. Among the involved farmers of the Pilot Project in Vojvodina there was a positive approach towards farmer cooperation with regard to manure storage & spreading, machinery rings and village cooperation.
Results	• At least one farmers cooperative sharing equipment for manure spreading and implementing BAP established in the Pilot Project area • Agricultural advisors are capable to initiate and advise farmers cooperatives and machinery rings • Legal and organizational standards important for the initiation of cooperatives and guidelines are elaborated and available for use in other areas of Serbia or in other countries of the lower DRB • Agricultural advisors in other areas of Serbia are trained on how to initiate and support farmer cooperatives
Short description of proposed activities	Indicatively the activities should include: • Analyse farmers cooperation based on a SWOT analysis • Train farmers and agricultural advisors on common use of machinery, manure and slurry tanks and usage of manure and slurry in agriculture • Organize training courses on assembly, managing and controlling of agricultural cooperation • Initiate and assist in the establishment and formation of a specialized farmers group sharing manure storage or spreading facilities and implementing BAP practices • Support farmers group in preparing of the field and fertiliser plan for the basic crops • Train and educate advisors and extension services in how to maintain cooperatives • Organize seminar on agriculture machinery for manure and slurry

	application incorporated with the slurry tank usage and construction • Organize visit to a agriculture fair (National and International)	
Duration	24 months	
Input	Experts:	
	Expatriate team leader	10
	Expatriate expert for Manure application and storage	5
	Expatriate expert for Agriculture machinery	5
	Expatriate expert in production of training material	3
	Expatriate expert in training	5
	Three national project coordinators, each 21 man-months (full time employed), Local team leader, agriculture expert and village cooperation expert	63
	Short term input of local experts and scientists	25
	Total, man months:	116
	Total, fee EUR (incl. travel and accommodation):	940,000
	Local logistics, secretarial, language support and office running, EUR	115,000
	Equipment for BAP agriculture activities, EUR	80,000
	Costs for dissemination and training activities, workshops, seminars etc., EUR	20,000
	Total, budget EUR:	1,155,000
Linked with other project ideas	This project idea could be linked with project idea 4 : BAP training and project idea 7:Development of fertiliser norms and manure standards in line with EU legislation	
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14.7. Fertiliser norms and manure standards for all lower Danube countries

Title	Development of fertiliser norms and manure standards in line with EU legislation
Overall objective	The overall objective is to ensure the agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way, with efficient use and recirculation of expensive plant nutrients rather than leaching to the environment.
Specific objective	The specific objective is that farmers are able to make effective and precise planning and accounting of their production, especially in relation to fertilising, manure management and storage of manure.
Results	The project will produce a) initial norms and standards as well as b)procedures for further development and annual up-dating: • Fertiliser norms will be based on analysis of fertiliser trials, describe the needs of the crop for plant nutrients, and cover crops for at least 90% of the cultivated area • Manure standards will be based on livestock types, productivity levels, feeding regimes, housing types and bedding material used, and will be expressed in figures ex. storage The norms and standards are developed in a way that complies with EU's legislation. The requirements to the norms and standards are given by the Nitrates Directive.
Background	Fertilisers in the former Yugoslavia and Soviet Union were cheap, prices of crops high and environmental considerations almost non-existing. Therefore, fertilizing traditions in the lower Danube countries are to distribute as much mineral fertiliser as the productivity optimum prescribes (this is often 25-100% higher than the economical optimum), and that the fertilizing effect of manure was disregarded / not considered part of fertiliser planning (while sound use of manure actually can cover the norms in most cases). It is imperative for the environment, especially for the aquatic quality of the Danube River and the Black Sea, that farmers and their advisers have tools that enable them to make effective and precise planning and accounting of their production, especially in relation to fertilizing, manure management and storage of manure. It would probably be relevant to develop fertiliser norms and manure standards regional-wise in large countries like Ukraine and Romania, where soils and cropping patterns vary considerably in different parts of the country.
Short description of proposed activities	Indicatively the activities should comprise: 1. National review of existing recommendations, legislation, possible completed fertiliser trials and other relevant data 2. Seminars and other activities to make scientists and experts aware of fertiliser norms and manure standard models used and prescribed in EU 3. Determination/formulation of (national) methodologies for elaboration of 1)

<table>
<tr><td></td><td colspan="2">fertiliser norms, and 2) manure standards
4. Determination of the institutional delegation in each of the countries
5. Determination of relevant crops (for fertiliser norms) and relevant livestock types etc. (for manure standards)
6. Identification, compiling, handling and analyzing of already existing data of relevance
7. Coordinating performance of new fertiliser trials
8. Organize registrations in stables for the production of manure standards
9. Issue the standards and norms and ensure the acknowledgement from relevant ministries and linked projects.</td></tr>
<tr><td>Duration</td><td colspan="2">36 months</td></tr>
<tr><td rowspan="14">Input</td><td colspan="2">Input needed to implement the activities, man months and Euro</td></tr>
<tr><td>Expatriate team leader</td><td>18</td></tr>
<tr><td>Expatriate expert in fertiliser methodology</td><td>6</td></tr>
<tr><td>Expatriate expert in fertiliser trials,</td><td>6</td></tr>
<tr><td>Expatriate expert in manure standards methodology</td><td>6</td></tr>
<tr><td>Expatriate expert in field registrations for manure standards</td><td>12</td></tr>
<tr><td>Expatriate expert in database management</td><td>6</td></tr>
<tr><td>7 National project coordinators</td><td>210</td></tr>
<tr><td>Pool of various local experts and scientists</td><td>42</td></tr>
<tr><td>Total, man months:</td><td>306</td></tr>
<tr><td>Total, fee EUR (incl. travel and accommodation):</td><td>2,090,000</td></tr>
<tr><td>Local logistics, secretarial, language support and office running, EUR</td><td>180,000</td></tr>
<tr><td>Workshops and seminars, EUR</td><td>30,000</td></tr>
<tr><td>Equipment , EUR:
• Data logger and measuring equipment for the field registrations in relation to manure standards
• Implements for performing of fertiliser trials
• Necessary computer software and hardware for the handling of databases</td><td>50,000</td></tr>
<tr><td>Total, budget EUR:</td><td>2,350,000</td></tr>
<tr><td>Linked with other project ideas</td><td colspan="2">This project proposal could be followed by proposals no. 7 (Fertiliser norms and Manure standards for all lower Danube countries), as fertiliser norms and manure standards are relevant to include in the legislation, and project idea no. 10 (Capacity building for advisory services with respect to Best Agricultural Practices), as adviser tools needs to be based on trustworthy norms.</td></tr>
<tr><td>Contact persons</td><td colspan="2">Senior Projects Manager, Mr. Henning Lyngsø Foged
Danish Agricultural Advisory Service, National Centre
Udkærsvej 15</td></tr>
</table>

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14.8. Reduction of the nitrogen and phosphorus load to the environment through better livestock feeding practices

Title	Reduction of the nitrogen and phosphorus load on the environment through better livestock feeding practices
Overall objective	The overall objective is to ensure the agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way, with efficient use of nitrogen and phosphorus in the feeding.
Specific objective	The specific objective is that farmers and their advisers have clear and modernized feeding norms and that advisory offers/products on feeding efficiency are developed and taken into use.
Results	The project will for each of the lower Danube countries produce: • Recommendations for modernized feeding norms for cattle and pigs, with special focus on the protein and phosphorus norms • Advisory offers/products on feeding efficiency are developed and taken into use
Background	Averagely 70% of nitrogen and phosphorus used in the feeding of livestock ends in the nature rather than in the products, but with big variations. Low feed efficiency of nitrogen and phosphorus in the feeding are due to • Use of un-balanced rations • Unknown value of roughage feeds and misleading information about the quality of commercial feeds • Feeding not complying with the productivity of the animal • Feeding norms are un-precise • Un-preciseness of the feeding (how to estimate how much 200 kg silage is?) • Bad feeding timing and bad hygiene practices The mentioned issues are like an evil circle, leading to low productivity, which further deteriorate the feed efficiency.
Short description	The activities should comprise:

of proposed activities	• Review, comparison and analysis of feed norms for cattle and pigs in the lower Danube, with weight on the protein and phosphorus norms • Organise a conference on feed norms for scientists and other experts, here under experts in feed legislation, from the lower Danube countries to discuss present norms in comparison with feeding norms in EU, needs for update of the present norms with weight on protein and phosphorus norms • Training of 25 trainers in efficient feeding and practical performing of feed efficiency control and feeding planning advice in cattle and pig herds • Estimation of possibilities and consequences for the feed legislation	
Duration	24 months	
Input	Input needed to implement the activities, man months and Euro	
	Expatriate team leader	12
	Expatriate expert in cattle feeding norms	3
	Expatriate expert in pig feeding norms	3
	Expatriate expert in feed legislation	3
	Expatriate expert in feed efficiency control and other practical feed advise for cattle	6
	Expatriate expert in feed efficiency control and other practical feed advise for pigs	6
	7 National project coordinators (full time employed)	140
	Pool of various local experts and scientists	30
	Total, man months:	203
	Total, fee EUR (incl. travel and accommodation):	1,320,000
	Local logistics, secretarial, language support and office running, EUR	130,000
	Workshops and seminars, EUR	25,000
	Equipment, EUR: • Equipment for feed efficiency control (mainly scales)	20,000
	Total, budget EUR:	1,495,000
Linked with other project ideas	This project proposal could be followed by proposals no. 7 (Fertiliser norms and Manure standards for all lower Danube countries), as feed norms must comply with the feed legislation, and project idea no. 10 (Capacity building for advisory services with respect to Best Agricultural Practices), as adviser tools needs to be based on trustworthy norms.	
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14.9. Pesticides, certificate for spraying and checking of equipment

Title	Introduction of international standards for performance of plant protection in primary production
Overall objective	The overall objective is to reduce the pollution of the Danube River and the Black Sea with leached pesticide residues to a minimum, and to ensure the quality of the drinking water, the food safety as well as the labour safety.
Specific objective	The specific objective is to introduce international standards for legislation, spraying certificate and test of field sprayers in the lower Danube countries.
Background	Spraying happens often in the lower Danube countries with sprayers that are not functioning properly due to lack of basic maintenance, calibration and adjustments, and the pesticides handled without consideration for the environment or for the personal safety and food safety.
Results	The project will for each of the lower Danube countries have the following results: • The legislation have been reviewed and updates have been drafted in case this is needed to ensure international rules and standards on spraying certificate and tests of field sprayers are introduced, and institutional delegation is clarified • Training material, mainly a textbook, on spraying is produced (handling, adjustment, maintenance, cleaning of sprayers etc., general knowledge about pesticides, labour safety and personal protection, storing and handling of pesticides, warning signs, identification of pests (weeds, insects, fungi), use of reduced doses and IPM • Curriculum for a pesticide spraying certificate developed and training of 25 trainers performed, as well as a pilot training of 25 farmers • Equipment for test of field sprayers is procured and official control personnel as well as agricultural advisers are trained in the test of field sprayers
Short description of proposed activities	Indicatively the activities should include: • Review of the institutional set-up etc., review of legislation and drafting of amendments. • Writing of textbook. Establish a group of writers headed by an editor. Organize the production and printing. • Organize curriculum development and perform training courses. • Procure equipment. • Perform training in test of field sprayers.

Duration	18 months	
Input	Input needed to implement the activities, man months and Euro	
	Expatriate team leader	12
	Expatriate expert in international standards and legislation about use of pesticides	3
	Expatriate expert in organizing of the production of text books	4
	Expatriate expert in test of field sprayers	6
	Expatriate expert in curriculum development and organizing of training	6
	7 National project coordinators (full time employed)	105
	Pool of various local experts and scientists	20
	Total, man months:	156
	Total, fee EUR (incl. travel and accommodation):	1,120,000
	Local logistics, secretarial, language support and office running, EUR	90,000
	Workshops and seminars, EUR	20,000
	Equipment, EUR: • One sprayer scanner per country • 10 sets/packages of equipment for test of field sprayers, and means for personal protection	35,000
	Total, budget EUR:	1,265,000
Linked with other project ideas	Not absolutely necessary – but especially the project idea 7 on "Fertiliser norms and Manure standards for all lower Danube countries" would give synergetic value to this project if performed simultaneously or later.	
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14.10. Capacity building of advisory services with respect to Best Agricultural Practices

Title	Capacity building for advisory services with respect to Best Agricultural Practices	
Overall objective	The overall objective is to ensure the agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way, with efficient use and recirculation of expensive plant nutrients and pesticides rather than leaching to the environment.	
Specific objective	The specific objective is that farm advisers are trained in the theories of Best Agricultural Practices, and that they have been practicing advice in Best Agricultural Practices with use of relevant adviser tools.	
Results	Each of the lower Danube countries will have adapted versions (with respect to language and norms) of the adviser tools developed within the UNDP/GEF DANUBE REGIONAL PROJECT. The adviser tools comprise: • Nutrient balance program • Field and fertiliser planning program • Cattle feeding program • Pig feeding program At least 25 advisers in each of the lower Danube countries have passed a test and received a certificate in Best Agricultural Practices. The training comprise: • Knowledge to Best Agricultural Practices and the related EU legislation and other relevant international standards • Training in use of adviser tools • Training in performance of face-to-face advisory consultations • Performing of advisory consultations of at least 5 farmers per adviser, with elaboration of nutrient balances, fertiliser plans and feeding • Test and certification.	
Background	Agricultural advisers in the lower Danube countries have typically a relevant education and are working mainly as extension officers (one-way communication to larger groups of farmers), but are normally without sufficient knowledge to Best Agricultural Practices, are not experienced with face-to-face advice, and have a lack of adequate adviser tools for production of individual nutrient balances or feeding and fertiliser plans.	
Short description of proposed activities	Indicatively the activities should include: • Adaptation of adviser tools, including translation and change of content of normative tables • Organizing of training courses, including test and certification.	
Duration	12 months	
Input	Input needed to implement the activities, man months and Euro	
	Expatriate team leader	10

	Expatriate expert in IT systems development	6
	Expatriate expert in organizing of the production of training material	3
	Expatriate expert in organizing of training	5
	7 National project coordinators (full time employed)	70
	Pool of various local experts and scientists	15
	Total, man months:	109
	Total, fee EUR (incl. travel and accommodation):	825,000
	Local logistics, secretarial, language support and office running, EUR	70,000
	Workshops and seminars, EUR	15,000
	Equipment, EUR: • Computer equipment for advisers	25,000
	Total, budget EUR:	935,000
Linked with other project ideas	Not directly, although this project ideally would follow project proposals no. 7 (Development of fertiliser norms and manure standards in line with EU legislation) and no. 8 (Reduction of the load of nitrogen and phosphorus on the environment through better livestock feeding practices)	
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14.11. Further awareness raising and dissemination activities

Title	Further awareness raising and dissemination activities
Overall objective	Agricultural production in the lower Danube countries happens in an environmentally safe and economically sound way and pollution through leaching of plant nutrients and PPPs from agriculture is minimized by efficient use and recirculation of farm inputs.
Specific objective	The awareness on issues regarding environmentally and economically sound agriculture and the concept of BAP is extended from the Pilot Project in Vojvodina to other parts of Serbia and the 7 lower DRB countries.
Background	The Project had a strong campaign and many successes have been achieved both in Serbia and the other 6 countries involved in the Project. As no particular budget was allocated to media and communication activities, however, awareness raising and dissemination activities were limited. The need for interventions like awareness raising and dissemination activities in Serbia is large. Environmental journalism almost does not exist. Public concern on environmental problems, especially in the rural areas of Serbia and the other countries of the lower DRB, strongly depends on media and communication activities promoting BAP. Generally there is a need to: - improve knowledge and understanding of the situation in 7 Lower Danube River countries through analysis, evaluation of data - support the development of environmental journalism - improve and upgrade a good media and communication strategy on the national and international level for 7 lower Danube countries - promote transboundary awareness networking, mutual learning, and the identification and dissemination of Best Agriculture Practices in the lower Danube countries - enhance the awareness of stakeholders and the general public about BAP in each of the 7 seven countries - boost the capacity of key advisory and extension services to promote and support BAP practices
Results	Expected results are as follows: • Public awareness campaign including TV, radio and other mass media on environmental issues of agriculture and BAP elaborated and implemented in all 7 lower DRB countries • Curriculum for course on environmental journalism developed and at least one course in each country implemented • Awareness and dissemination material on environmental issues of agriculture and BAP are developed and available in all languages of the 7 lower DRB countries

	• Newsletter on BAP initiated and distributed in all 7 lower DRB countries • Workshops and consultation meetings for regional and local beneficiary groups (farmers, local and regional authorities, NGO's, advisory and extension services) are conducted in all 7 lower DRB countries and respective materials on BAP are developed and translated in all 7 languages	
Short description of proposed activities	Project activities will include the following types of action: • Analyze environmental media reporting • Organize training course on environmental journalism guided by trainer of trainers • Develop a media and communication strategy for TV, radio and printed mass media on environmental issues of agriculture and the dissemination of BAP to address regional and local beneficiary groups (farmers, local and regional authorities, NGO's, advisory and extension services) • Establish a newsletter on BAP issues on national and international level (lower Danube countries) • Organize workshops and consultation meetings and prepare respective materials on BAP • Produce a specific fact sheets on BAP issues	
Duration	18 months	
Input	Input needed to implement the activities, man months and Euro	
	Expatriate team leader	12
	Expatriate expert in environmental awareness	6
	Expatriate expert in communication and media strategy	6
	Expatriate expert in organizing of training	5
	National project coordinators, one on agriculture and environment and one on awareness and dissemination activities (full time employed)	105
	Pool of various local experts and scientists	28
	Total, man months:	162
	Total, fee EUR (incl. travel and accommodation):	1,100,000
	Local logistics, secretarial, language support and office running, EUR	100,000
	Camera and other media equipment, EUR	10,000
	Dissemination activities, EUR	30,000
	Total, budget EUR:	1,240,000

Linked with other project ideas	This project proposal could be linked with all mentioned proposals, as campaign is a necessity to achieve public involvement. It is especially the case when environmental topics are the central issues, as they receive the lowest media and therefore public attention.
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14.12. Policy formulation and drafting of agro-environmental legislation

Title	Establishment of agro-environmental conventions for the lower Danube countries
Overall objective	The overall objective is to reduce the pollution of the Danube River and the Black Sea with leached plant nutrients and pesticide residues to a minimum.
Specific objective	The specific objective is to establish a set of recommendations for agro-environmental policies and legislation that the participating countries have committed themselves to include in the national legislation.
Results	The project will produce: • A forum for agro-environmental conventions with delegation from the lower Danube countries • A convention on agro-environmental policies in the lower Danube countries • At least three concrete conventions on agro-environmental legislation.
Background	Protection of the water quality and preservation of the environment in general is a trans-national challenge, which must be treated as such. The lower Danube countries, comprising former Yugoslavian and Soviet Union countries, has since their independence concentrated on the establishment of a better infrastructure and the introduction of democracy and liberal markets. The consideration for environmental issues has so far had a secondary role in policy formulation and legislation. The countries are, however, in different steps and due to their geopolitical situation, on their ultimate way to become member of EU, where the environmental concerns are integrated into all policies and legislation. Furthermore, the lower Danube countries have an interest in an absolute minimal pollution of the Danube River and other waters and biotopes. The agricultural sector makes often a major contribution to the pollution of the environment, and the countries have problems with stores of banned pesticides, hot spot pollution from big farms, diffuse pollution from bad manure management practices, illegal use of pesticides, etc.
Short description of proposed activities	Indicatively the activities should include: • The project will work through a series of international conferences for delegates from the lower Danube countries, highlighting on the agro-

	environmental status in the countries, EU policies within the agro-environmental area, and other international activities to make similar agro-environmental conventions. • The conferences would be organised by a secretariat, established by the project	
Duration	18 months	
Input	Input needed to implement the activities, man months and Euro	
	Expatriate project leader	12
	Local team leader (full time)	15
	Total, man months:	27
	Total, fee EUR (incl. travel and accommodation):	295,000
	Local logistics, secretarial, language support and office running, EUR	100,000
	Budget for running of 8 international conferences (flight tickets, conference venue, Per Diems, speakers, etc.), EUR	50,000
	Total, budget EUR:	445,000
Linked with other project ideas	This project idea would provide synergetic effects to practically all other mentioned project ideas.	
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ANNEX 1: LIST OF CONTENT ON THE FINAL REPORT CD

Most of the material listed below as included on the Final Report CD can also be found on the project homepage (http://www.carlbrodrp.org.yu/).

The Final Report in word format

The folder includes this report in word format.

Technical Reports

The folder includes the following reports in word format:

- Best Agricultural Practices

- TR I: Analysis of current national legislation about fertilizers, manure and pesticides

- TR III-IV: Review of agrochemical inventories and recommendations for reducing the impact of agrochemicals

- TR II-V: Recommendations for BAP and introduction of concepts for the application of BAP in the lower DRB countries

- TR VI: Detailed work programme for the Pilot Project

Reports on Analysis of Current Legislation on Agrochemicals and Enforcement elaborated by the project partners in the 7 lower Danube countries

The folder includes the following reports in word format:

- Analysis of Current Legislation and Enforcement, Bosnia and Herzegovina
- Bulgaria: Analysis of Current Legislation and Enforcement, Fertilizer, Manure, Pesticides
- Analysis of Current Legislation and Enforcement in Croatia, including Annex I: List of approved plant protection products for placing on the market and its use in the Republic of Croatia
- Report on Moldovan Legislation and Review of Agrochemical Inventories, including Annex 1: Detailed list of relevant laws

Present Legislation concerning the Use of Fertilizers and Pesticides in Romania

- Report on Analysis of Current Legislation and Enforcement in Agriculture , Serbia and Montenegro

- Using of agrochemicals in Ukraine- Practice of nature-conservative agriculture

Reports on training activities in the 7 lower Danube countries elaborated by the project partners in the 7 lower Danube countries

The folder includes the following reports in word format:

- Report on DRP Training in Bosnia and Herzegovina
- REPORT ON DRP TRAINING OF BEST AGRICULTURAL PRACTICES, B U L G A R I A
- Implementation of training program and dissemination of project results related to introduction of Best/Good Agricultural Practices in Danube area of Croatia, 2006
- Report on DRP Training in the Republic of Moldova
- R E P O R T, TRAINING ACTIVITIES IN ROMANIA
- Report on DRP Training in Serbia
- Report on DRP Training in Ukraine

Some of the reports with annexes.

List of training and dissemination activities of the Project

The folder includes a table summarising all workshops & training events & awareness raising activities of the project.

Pictures from the implementation of the Project

The folder includes photos from all the 8 Pilot Project farms and from workshops and other dissemination activities in Serbia.

Videos from the implementation of the Project

The folder includes two videos:

3. Movie about pilot project made by RTS Television in Serbia
4. The Best Agriculture Practise **– incl. building of a manure pad, produced by the Project.**

Minutes of meetings

The folder includes:

05_09_09: Minutes from kick off meeting in Vienna

05_10_01: Minutes from meeting with Agroziv, Poultry Slaugtherhouse Yuko

05_10_01: Minutes from meeting with Farm Svina, Secan

05_10_01: Minutes from meeting with Vladimir Sindic, Assistant to the Secretary for Agriculture, Vojvodina

05_10_01: Minutes from meeting with Zlatica enterprise

05_10_03: Minutes from meeting with Directorate for Water, Ministry of Agriculture, Forestry and Water Management

06_03_02: Minutes from meeting with WB Danube River Enterprise Pollution Reduction Project, Serbia

06_05_31: Minutes from meeting with WB Danube River Enterprise Pollution Reduction Project, Serbia

06_08_17: Minutes from meeting with WB Danube River Enterprise Pollution Reduction Project, Serbia

06_10_30: Minutes from meeting regarding WB project on agriculture in Ukraine

06_12_30: Minutes from meeting regarding WB projects on agriculture in Croatia and Moldova

06_12_30: Minutes from meeting regarding WB project on agriculture in Ukraine

Workshops by the Project

The folder includes.

- Programme, presentations, conclusions from Workshop for training partners in Belgrade, 20-23.02.06

- Seminar on Nutrient Balance Calculations, Field and Fertiliser Planning and Plant Protection Planning, 10 April 2006, Zrenjanin Agricultural Institute

- Seminar on Feeding Planning, 16 August 2006, Zrenjanin Agricultural Institute

- Presentations of the project on the seminar on “Problems and Prospects of Agricultural Production, Food Safety and Quality Competitiveness Raising in Ukraine. Role of Agricultural Advisory”, October 25-27, 2006 Kyiv

WORKING FOR THE DANUBE AND ITS PEOPLE