Livestock Waste Management in East Asia
LWMEA (GCP/RAS/215/WBG)

The World Bank | Global Environment Facility | The Food and Agriculture Organization

SPATIAL DECISION SUPPORT TOOL (DST)

CONCLUSIONS AND RECOMMENDATIONS FROM THE POLICY WORKSHOP BANGKOK JUNE 17-19 2008 AND THE TECHNICAL MEETINGS WITH AIT

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Summary

From 17th to 19th of June 2008 a policy development workshop was held at the Amari Watergate Hotel in Bangkok, with representatives of GuangDong, Vietnam and Thailand, as well as a delegation of the FAO. Furthermore, technical consultation meetings with experts of the Asian Institute of Technology (AIT) took place on 16th and 21st of June. The results from the workshop can be summarized as follows:

- During the policy workshop the countries' replication strategies, codes of practice (COP) and next steps in the policy development were presented and discussed. The workshop showed a variety in the detailing and progress between the countries. Zoning was being discussed as one of the most important policy instruments to support a more sustainable development of livestock production. Therefore, a spatial Decision Support Tool (DST) can be a relevant tool, which was presented and discussed during the first and third day of the workshop.
- There is a keen interest for a spatial DST to support policy development and decision making in all the countries. The use of a spatial DST at national or provincial level can support the strategic, regional planning and decision making on livestock production areas. However, the discussions revealed some strong doubts on the applicability of the tool at the local level in GuangDong and Vietnam, given the lack of detailed geographical data. At present, the use of the tool at the local level to support the allocation of individual livestock farms will only be possible in Thailand. In Vietnam and GuangDong these detailed analyses might only be possible on the longer term, after more detailed geographical data will become available.
- The workshop also addressed the requirements and availability of statistical and geographical data in the three countries (see also the previous item). The need to identify critical data was discussed. The appendix of this report provides an indicative list.

The technical meetings with AIT allowed valuable discussions to prepare for the software development of the spatial DST.

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1. Introduction

This report describes the results of a policy development workshop and technical consultation meetings with experts of the Asian Institute of Technology (AIT), during a mission to Bangkok from 16th to 21st of June 2008. Based on the results recommendations will be provided on the further development of the spatial DST.

1.1. Context of the mission

For the context of this report and further technical details on the spatial DST, please consult the previously published technical reports:

Carsjens, G.J., and Chen Wenbo, 2008. Framework for a spatial decision support tool for policy and decision making: Technical outline. Wageningen University, January 2008, 42 p.

This report described the technical outline of the spatial DST, which does not include complex and state-of-the-art GIS techniques, but instead tries to be as clear and simple as possible, in order to give the potential users a full understanding of the analysis process and its output. The output needs to be accompanied by supporting information on its reliability and the shortcomings due to unreliable or missing input data, as well as the consequences for use of the output. Therefore, a comprehensive meta-data assessment system is proposed as an integrated part of the spatial DST.

Carsjens, G.J., Gerber, P., 2007. Decision support tool for spatial planning and decision making: Technical support. Consultant report on the joint project mission held in SE Asia from 13th to 24th April 2007. August 2007, 32 p.

This report describes the results of a series of workshops and technical meetings in Hanoi, Bangkok and Guangzhou in April 2007, as well as recommendations for the further development of the spatial DST. During the workshops and technical meetings, the country participants identified: (1) the country specific policy and decision making context and needs for spatial planning of future livestock production; (2) the requirements of a supporting tool and its basic components; and (3) the practical arrangements to be made for developing the tool (operational users, target groups (stakeholders), technical capacity, data requirement and data supply, etc.). Furthermore, the report describes the results of technical meetings with dedicated national experts with the expertise to contribute to the further development of the spatial DST.

Carsjens, G.J., 2006. Spatial planning and decision support of livestock production in East Asia. FAO, GCP/RAS/203/WBG Livestock Waste management in East Asia Project, November 2006, 37 p.

This report is an updated and revised version of the final report of the preparation phase of the LWMEA project (see below), based on the results of the mission and regional workshop in Hanoi, Vietnam, in October 2006.

Carsjens, G.J., 2004. Spatial planning of future livestock production, Livestock waste management in East Asia. GEF project GCP/RAS/203/WB, Report of the international consultant on Spatial Planning, Land Use Planning Group, Wageningen University, The Netherlands, September 2004, FAO, 2004, 41 p.

This report is the final report on spatial planning and decision making of the preparation phase of the LWMEA project, and includes a description of the conceptual framework of a spatial planning DST, based on the experiences of the Area-Wide Integration (AWI) pilot projects.

1.2. Objectives of the mission

The overall objectives of the mission were:

1. To review and discuss the progress of the countries with respect to their replication strategy and codes of practice (COP), and to discuss the relationships between the policy development and the spatial Decision Support Tool (DST);
2. To identify the requirements of a policy support tool and its basic components;
3. To discuss the next steps in the development of the spatial DST, with respect to the software programming by the Asian Institute of Technology (AIT).

Each country was represented by a group of dedicated experts and/or policy makers.

1.3. Itinerary of the mission

The mission schedule with regard to the spatial DST development is presented in Annex 1. In general, the visit included two elements: (a) support to the policy development workshop, and (b) technical consultation meetings with AIT representatives.

2. Policy development workshop

The policy workshop took place from 17th to 19th of June 2008 at the Amari Watergate Hotel in Bangkok, with groups of representatives of GuangDong, Vietnam and Thailand, as well as a delegation of the FAO. During the policy workshop the countries' replication strategies, codes of practice (COP) and next steps in the policy development were presented and discussed. During the preparation phase of the LWMEA project, zoning was identified as one of the most important policy instruments to support a more sustainable development of livestock production. Therefore, the workshop specifically addressed the development and use of a spatial Decision Support Tool (DST) as a policy support instrument. This chapter will especially present the results of the discussions which took place in the presence of the consultant Gerrit Carsjens, and related to the spatial DST. A detailed program of the workshop is included in Annex 2.

2.1. Progress Report and Policy Instruments (Day 1)

The morning session of the first day of the workshop included an introduction to the context and approach of developing a spatial DST in relation to policy and decision making. The PowerPoint that was used is included in Annex 4. The afternoon session focused at discussions in working groups. Group C was on the research and analytical work to underpin development and analysis. This group discussion especially addressed the development of the (spatial) decision support tool (DST) and its use in policy development and decision making. The discussion focused on two main issues:

1. Availability and reliability of data and information
2. Zoning policies and regulations

Ad 1. Availability and reliability of data and information

- A first important issue that needed to be clarified is the use of the country specific data for the spatial DST. These data will be the countries responsibility only and no data needs to be transferred to any organization or person outside each country. The spatial DST will be developed with a test dataset of Thailand, and Guangdong and Vietnam will receive the (concepts of the) tool that allow them to test the tool on their own dataset.
- With respect to the availability of data the countries:
  - Identified the need for setting up an integrated database, but also the difficulties of the sharing of information between different departments (Guangdong).
  - Exposed a potential mismatch of (geographical) data derived from different organizations, departments or ministries, which needs to be resolved (Thailand).

- With respect to the reliability of data the countries:
  - Indicated that livestock farmers tend not to provide accurate data on livestock numbers and waste management treatment, due to tax systems (Thailand and Guangdong)

- With respect to the collection of data:
  - These include statistical data of different administrative levels (national to local) and geographical data (maps) at two different scales (1:250.000 to 1:500.000 for national/provincial level analysis and 1:50.000 scale for local level analysis).
  - The countries stated that not all data will be equally important, and therefore critical data need to be indentified. FAO and the international consultant on spatial planning can make an indicative list.
  - Each country needs to identify the requirements, capacity and needs for data collection, based on the indicative list.

- Based on these issues the question was addressed if the use of a spatial DST at national/provincial and the local level in each country will be realistic. For Thailand this seems possible, given the availability of national as well as local level data. The use of the tool at the local level in Vietnam and Guangdong seems not realistic on the short term, given the lack of detailed geographical data. However, both countries stressed the relevance of using the tool at national/provincial level. In Vietnam there might be some options for use at the local level in some limited areas (high density pig production areas). Related to this question Thailand identified some potential conflict in different interests between the different departments, especially those of livestock and environment. This needs to be resolved by a closer cooperation between both departments.

Ad 2. Zoning policies and regulations

- Guangdong indicated that standards for zoning are being applied by SEPA, but there seems to be a lack of a systematic approach, which results in conflicts between different departments and different administrative levels.
- In Guangdong strict regulations are being enforced in sensitive areas, especially in critical river regions.
- Vietnam and China have implemented EIA for large pig farms (in Vietnam over 1,000 cattle, including pigs and cows, or over 20,000 poultry; in China for large-scale commercial farms), while Thailand currently lacks an EIA for new livestock farms.
- Thailand described the present lack of any zoning policies for livestock farms. The last few years this has been frequently discussed, especially from health risk point of view. However, no zoning policies have been implemented yet, basically because of the expected large implications for present livestock farms in the two main pig production areas. The discussion resulted in the suggestion to try to gradually implement new zoning policies, at first addressing new farms and over time expanding towards present farms.

Concluding, the spatial DST might be easily implemented and use in Thailand at national as well as the local level. Main challenge in Thailand will be the establishment of new zoning policies and regulation (and possibly also EIA) as policy instruments to able to use the results of the spatial decision support tool. In China and Vietnam, zoning policies and EIA are already implemented, but need to be enforced, where the spatial DST might support policy and decision makers with useful information (suitability maps). The main challenge here will be the collection of data, at present for the national/provincial level, and on the longer turn for the local level.

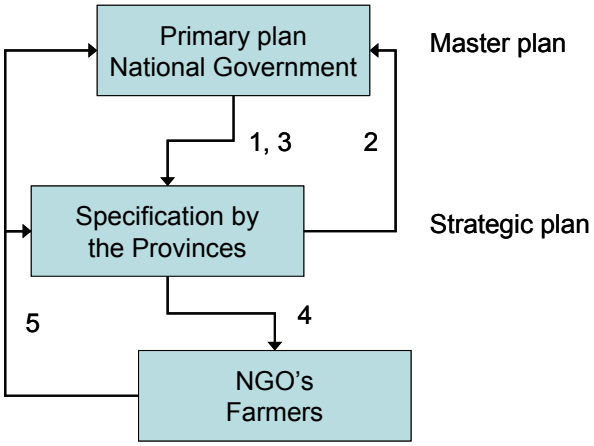
2.2. Replication Strategy (Day 2)

On the second day the countries presented their replication strategies, which were discussed and detailed in group discussion in the afternoon. Gerrit Carsjens was present with the group discussion of the Vietnamese group. Although the discussion took place in Vietnamese language, some questions and topics could be addressed through the translator. Main issue with the replication strategy was the level of detail that was presented in the morning session. It was uncovered that much more work with respect to the replication strategy has been done, and a more detailed work plan is already available, which was than presented in the feedback presentation on day 3.

Some topics of the discussion were:

- The demonstration site in the North of Vietnam is for 90% finished, a contract for the site in the South has just been signed, while a third site is being considered.
- Zoning regulations and policy have not yet been established in Vietnam. There are some first proposals, but without clear objectives and criteria.
- New policy to stimulate industrial large livestock production farms has recently been approved, and covers the present until 2015.

- The enforcement of environmental policy and regulations is low. The actions taken to improve enforcement include coupled laws and regulations, as well as improved management capacity. The specific steps taken are:
    - A revision of the law on environmental legislation by MONRE has recently been started. Foreign experts have been providing advice to MONRE and were involved in drafting the new policy. The scheme of the process (see below) with its subsequent steps (1 to 5), including feedback from provinces, NGO's and farmers, will take 6 months to 1 year to finish.



    - New environmental policy has been implemented for large cities, and should be implemented for smaller towns by 2010.
    - More and better trained environmental inspectors will be employed.
    - A new plan on establishing new monitoring stations and network is in the first phase of implementation.
    - Management of livestock production at the household level will be supported by NGO's.
- The development of new environmental indicators for livestock production.
- Different ministries and NGO's will be involved with the new policy development.
- Implementation of subsidies for environmental-friendly waste-water technology has been implemented.

One question with discussion could not be answered, and this concerned the effectiveness of the new policy and regulations. It was stated that the effectiveness can only be measured some time after implementation.

2.3. Codes of Practice (COP) and Next Steps (Day 3)

On day 3 the results from the country group discussions and Codes of Practice (COP) were presented and discussed. The COP again revealed a variety in topics and level of detail among the countries, which need to be dealt with in the remainder of the project.
The afternoon again focused at the development of DST. First, the outline of a policy DST was presented by Henning Steinfeld. A policy DST would include:

1. A compendium or catalogue on knowledge, experiences, successes and failures in pig production, from Europe, North-America and East Asia. The DST would provide reference to documents, regulations, licensing, zoning and manure technology. The context and applicability would be added in comments.
2. An economic analysis at farm level, in a spreadsheet-like model, including different production types, scale, accessibility to land, and other information, and the estimated production costs. The model should give the indicative implications of different policy options on farm economics (investments, running costs), which allows de-

veloping different policy scenarios. These scenarios address how different types of farms react, based on production costs.

3. The model might be linked with the statistical and geo-data of the spatial DST (see below), allowing the assessment of changes in the livestock distribution due to different policy options.

The components and steps in the development of the spatial DST were presented next. The PowerPoint that was used is included in Annex 4. The presentation showed the different components of the spatial DST, and some examples of required input and potential output from the AWI project in East Thailand. Also, the next steps in the development of the spatial DST and the data gathering were presented. Again, it was concluded that the spatial DST can be implemented and used in Thailand at national as well as the local level, given the widely available geo-data. In China and Vietnam the spatial DST may support policy and decision makers with useful output (suitability maps) at the national/provincial level, but at present this will not be possible for the local level, given the lack of detailed geo-data.

The responses of the countries during the discussion revealed some mixed interests and various perceptions on the requirements and use of the proposed DST. This resulted in the conclusion to send a concept note on the DST to the countries, with the question if we should go ahead with these DST or not.

3. Technical meetings with AIT

Technical consultation meetings with experts of the Asian Institute of Technology (AIT) took place on 16th and 21st of June, with the aim to discuss the planning of the next steps in developing the spatial DST, and the contribution of AIT in it.

16 June 2008, meeting at AIT
Present: Dr Oleg Shipin, Dr Nitin Tripathi and Mrs. Wutja Nun from AIT; Gerrit Carsjens, FAO consultant.

Conclusions from the meeting:

- The objectives, approach and context of use of the spatial DST were discussed. The part on the components was to be discussed in a second meeting on 21 June, as well as next steps in the development in the spatial DST and final arrangements will also be discussed on 21 June.
- Mrs. Nun was introduced as one of the software programmers that will be doing the actual programming, and who will also be the prime contact person of AIT with Gerrit Carsjens.
- Mrs. Nun and Gerrit Carsjens discussed the background, context and approach of the spatial DST in detail afterwards.
- To further increase the understanding of the context of use of the spatial DST, it was also agreed that Mrs. Nun will participate in the afternoon session of Group C on Research and analytical work to underpin policy development and analysis at the policy workshop on Tuesday 17th of June.

21 June 2008, meeting at Amari Watergate Hotel
Present: Mrs. Wutja Nun and Gerrit Carsjens, contact by telephone with Dr Nitin Tripathi

Conclusions from the meeting:

- AIT (Mrs. Nun) has a good understanding of the requirements and context of use of the spatial DST, and is willing to participate in the software programming and training of the spatial DST.
- Gerrit Carsjens and Nitin Tripathi will discuss a draft TOR for the software development in June and July 2008. The TOR needs to be finalized and approved by FAO afterwards, since the TOR involves a contractual relationship between FAO and AIT. Gerrit Carsjens will take a lead in drafting the TOR.
- Mrs Wutja Nun will be coordinating the software programming at AIT, and will be supported by two other PhD-students at AIT.
- Gerrit Carsjens will provide AIT with a basic statistical and geo-data set for Region 2 in Thailand for developing and testing purposes.
- The objectives and criteria used in the AWI project in Region 2 will also be used as such.

4. Conclusions and recommendations

4.1. Conclusions of the workshop and technical meetings

Despite the differences in backgrounds of the workshop participants, some relevant discussions took place on the use of the spatial DST and its relationships with policy development, implementation and enforcement. Some general conclusions are:

1. Zoning is an important policy instrument to support a more sustainable development of new livestock production. The spatial DST will allow the support of regional planning and zoning of livestock production areas in all three countries. However, a detailed zoning of individual farms at the local level will not be possible in Guang-Dong and Vietnam given the lack of detailed geo-data. This is expected not to improve on the short term.
2. The linking of the spatial DST with an economic assessment tool has been discussed. This will be possible, also at the local level in Vietnam and Guangdong, by using statistical data, linked to a map with the different administrative areas. A more detailed geographical distribution will not be possible for GuangDong and Vietnam given the lack of detailed geo-data as mentioned with the first item.

Some other conclusions related to the policy workshop are:

1. During the discussion on replication strategies it was concluded that EIA will only be a suitable instrument for large commercial pig farms. Consequently, rapid increases in the number of small farms in a particular area are not being addressed. This might be dealt with by introducing Strategic Environmental Assessment (SEA) at the level of policy, programs and plans. The SEA directive and framework of the EU might be used as an example here.
2. During the discussions communication between different ministries, departments, stakeholders and the general public showed an important topic. Therefore, communication strategies and interactive policy making should be an integral part of policy development. Some relevant references for such approaches are:
   - http://www.gcis.gov.za/docs/publications/commhb/index.html is a reference to a website on government communication strategies, part of GCIS (Government Communication and Information System) of the government of South Africa, which includes different relevant pdf documents.
   - http://www.fao.org/sd/dim_kn1/kn1_050902_en.htm refers to a website with a pdf of a handbook by the FAO (2005), based on experiences in Africa, entitled: Participatory Communication Strategy Design: A Handbook. 2nd Edition.

   Another interesting paper is on communicating Dutch nature policy, a paper by Aarts and van Woerkum (2000) entitled: Communication in nature management policy making. It is included as Chapter 2 in a book by Rientjes, S. (Ed.), Communicating nature conservation, European Centre for Nature Conservation, pp. 27-47.

   These websites and paper are, of course, focused at their country specific context and topics, but also provide some general information on approaches, methods and other materials that are of use when developing communication strategies in the context of LWMEA.
3. The technical meetings with AIT resulted in identifying and detailed discussions with the coordinating software programmer. A draft TOR for the software programming will be discussed by Dr Nitin and Gerrit Carsjens. The contract should be issued by FAO.

4.2. Recommendations for the development of a spatial DST

What has been done so far?

a) The context of use has been identified for each of the participating countries, including the:
   - Decision making process for small farms
   - Decision making process for large farms
   - Potential users of the tool
   - Potential users of the output of the tool
   - Required statistical and geographical data
   - Data holders
   - Stakeholders to be involved in the policy workshop
   - Stakeholders/experts to be involved in the technical workshop

   For further details see the previous reports that are listed in the introduction.
b) The user requirements have been identified.
c) The technical outline of the several components of the spatial DST has been written.
d) The potential software developer has been identified: AIT in Bangkok, which again expressed their interest in being involved in the LWMEA project during the technical meetings and policy workshop.
e) The relationships between the spatial DST and policy development have been discussed during the policy workshop.

The recommended next steps in the developments process including an indicative time-frame are listed in the table below.

Tasks (regional)	**Time**
1. Drafting the TOR's and contracting the software developer, the coordinating international expert and the national experts	July 2008
2. Writing the software architecture description	1 month
3. Software coding draft version of the spatial DST	3 months
4. Presentations and testing in each country	2 months
5. Software coding final version	3 months
6. Documentation and translation	2 months
7. Launch at training workshop	June 2009
8. Updating and maintenance	2009 -

For these tasks FAO and the coordinating expert should take the lead. During the process of software coding and testing regular feedback and communication between the software developer and the coordinating expert in spatial planning and GIS will be required, as further detailing of the spatial DST will need to take place during the process. Also, components of the spatial DST will need to be tested during the process by country experts.

The specific tasks for the national experts are listed in the table below.

Tasks (national)	**Time**
1. Policy review and assessment	Start now
2. Collecting statistical and geo-data	Start now
3. Building statistical and geo-database	Start now

Note: These tasks are continuous tasks, as the policies and data will be changing in time and therefore need to be maintained and updated on a regular base. The national experts should therefore be at a position and institute which support such a task, and allow an optimal access to statistical and geo-data. In all three countries it is recommended to have a university involved with these tasks. The list of critical and less critical data in the appendix needs to be communicated with the countries' experts.

For further details on individual steps see the technical outline report which is listed in the introduction.

Appendices

A1. Mission schedule
A2. Agenda of the Policy Development Workshop – Support to Environmental Policy DST, 17-19 June 2008, Bangkok, Thailand
A3. Indicative list of critical and less critical data
A4. PowerPoint presentations on the context and objectives of the spatial DST, and the technical components and next steps of the spatial DST

A1. Mission schedule

Agenda of Gerrit Carsjens related to spatial DST development and policy workshop

Date	Day	
16-06-08	Monday	Technical meetings with Dr Oleg Shipin, Dr Nitin Tripathi and Mrs Nun at AIT
17-06-08	Tuesday	Policy Workshop at Amari Watergate hotel
18-06-08	Wednesday	Policy Workshop at Amari Watergate hotel
19-06-08	Thursday	Policy Workshop at Amari Watergate hotel
20-06-08	Friday	Report writing
21-06-08	Saturday	Technical meeting with Mrs Nun of AIT at Amari Watergate hotel

A2. Agenda of the Policy Development Workshop – Support to Environmental Policy DST, 17-19 June 2008, Bangkok, Thailand

Objectives of the Workshop:
The primary objective is to support LWMEA country teams by providing an ad-hoc support by jointly analyzing issues and options they come across in implementation of component two. The workshop shall allow cross-country exchanges and progress monitoring. It also aims to move towards the preparation of a consolidated Decision Support Tool for environmental policy development.

Agenda:

DAY ONE - 17 June 2008: Progress Report and Policy Instruments

8.30	Registration
9.00 - 9.30	Introduction *Welcome address: Mr Hans Wagner, FAORAP* *Workshop's context and objectives: Mr Henning Steinfeld, FAO HQ*
9.30 - 10.30	Presentations on progress report on component 2 (20 minutes each) *Chinese delegation* *Thai delegation* *Vietnamese delegation*
10.30 - 11.00	*Coffee break*
11.00 - 12.30	Presentation on policy instrument for livestock waste management (30 minutes each) *Mr Ge Backus, Wageningen UR LEI – Policy instruments addressing new farms* *Mr Henning Steinfeld, FAO HQ, - Policy instruments addressing existing farms* *Mr Gerrit Jan Carsjens, Wageningen University - Research and analytical work to underpin policy development and analysis*
12.30 - 13.30	*Lunch break*
13.30 - 15.30	Working group session on policy instruments for livestock waste management *Group A: Policy instruments addressing new farms* *Group B: Policy instruments addressing existing farms* *Group C: Research and analytical work to underpin policy development and analysis*
15.30 – 16.00	*Coffee break*
16.00 – 17.30	Report to plenary and discussion
18.00	Cocktail reception at pool side

DAY TWO - 18 June 2008: Replication Strategy

8.30 - 9.30	Feed back and consideration on day one and introduction to day two discussion
9.30 – 10.00	Presentations on replication strategy *Chinese delegation*
10.00 - 10.30	Presentations on replication strategy *Thai delegation*
10.30 - 11.00	*Coffee break*
11.00 - 11.30	Presentations on replication strategy *Vietnamese delegation*
11.30 - 12.00	Question and comment from country members on the replication strategies
12.30 - 13.30	*Lunch*
13.30 - 17.00	Working group session on replication strategies – to follow up the progress from the last workshop in December 07, to assess the drafted replication strategies for adjustments/additions and revision of the drafted implementation plan *Group A: China* *Group B: Thailand* *Group C: Vietnam*

DAY THREE - 19 June 2008: Code of Practice (COP) and Next Steps

8.30 - 9.30	Report to plenary and discussion on revision replication strategies (Day Two) and introduction to Day Three discussion
9.30 - 10.00	Presentations on COP *Chinese delegation*
10.00 - 10.30	Presentations on COP *Thai delegation*
10.30 - 11.00	*Coffee break*
11.00 - 11.30	Presentations on COP *Vietnamese delegation*
11.30 - 12.00	Question and comment from country members on the COP
12.30 - 13.30	*Lunch*
13.30 - 15.30	Introduction of the concept and next steps of Policy DST – Mr Henning Steinfeld Introduction of the concept and next steps of Spatial DST – Mr Gerrit Carsjens Plenary discussion on support required and next
15.30 - 16.00	Conclusion and Closure

A3. Indicative list of critical and less critical data

The required statistical data include data for the most recently available year, and should be updated yearly (or more frequently if possible). These data should be collected for the available administrative areas from state to the most local level, and made available in a spreadsheet (xls, dbf or similar formats).
The required geographical data should be collected as shape files or other format that allows a conversion to ArcGIS. The geo-data should be available for the national/provincial/regional level (scale 1:250.000 to 1: 500.000) for the whole country (province of Guangdong) and, if available, also for the local level (1: 50.000 scale), starting with the administrative areas of the demonstration projects.

I. Critical data

Statistical data
The critical statistical data include:

1. Statistics on livestock types
2. Numbers and sizes (categories) of livestock farms
3. Numbers of slaughterhouses and feed mills at the most local administrative level
4. Statistics on crops types and crop production
5. Statistics on numbers of inhabitants, rural population, households
6. Statistics on social indicators and socio-economic data

Geographical data
The critical geo-data are:

1. The administrative boundaries for provincial to local administrations
2. The main road and rail infrastructure
3. Main surface water elements, such as rivers and lakes
4. Elevation data
5. Land use map with main land use types, covering agricultural area, forest and natural area, and built-up area (residential and industrial areas)
6. Nature reserve areas, natural parks, wetlands, and similar areas with protected animal or plant species

II. Important data, but less critical

Statistical data
Additional statistical data, including:

1. Cultural background and heritage, land tenure status, non-agricultural employment opportunities, potential for tourism and scenic areas.

Geographical data
Important, but less critical geo-data are:

1. The minor road infrastructure
2. Minor surface water elements, such as streams and the borders of basins
3. Soil map
4. Soil erosion and soil erodibility
5. Groundwater depth and/or leaching risk
6. Detailed land use map, covering at least 20 to 30 different land use classes, including different types of agriculture (major crops)
7. The locations of livestock farms, especially large and medium-size commercial farms
8. The locations of important elements of the livestock production chain, such as slaughterhouses, feed mills, distribution centers, and others

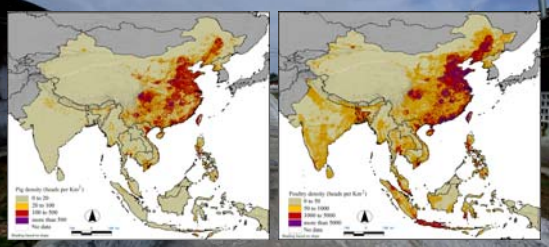
A4. PowerPoint presentations on the context and objectives of the spatial DST, and the technical components and next steps of the spatial DST

Research and analytical work to underpin policy development and analysis

LWMEA – Decision Support Tools (DST)

Gerrit J. Carsjens
Wageningen University, The Netherlands

2. Problem description and objectives



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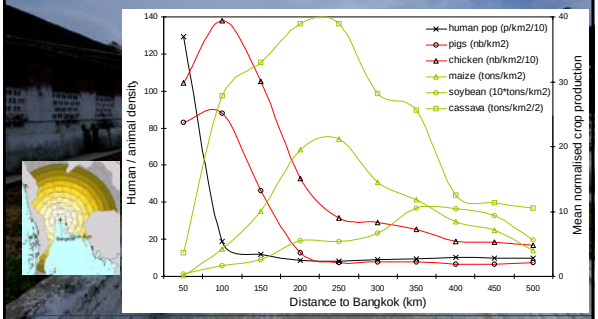
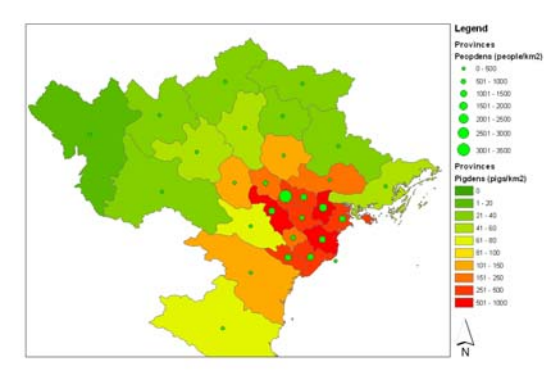


2. Problem description and objectives



2. Problem description and objectives

Overall objective

Develop a spatial decision support tool (DST) to support a more sustainable spatial planning and distribution of livestock production areas

Therefore the spatial DST should be able to:

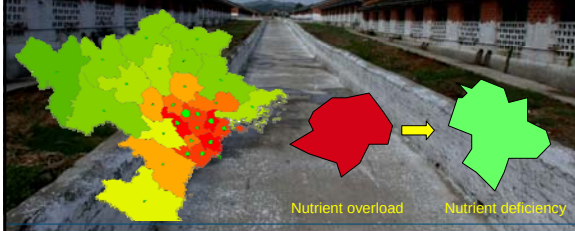
- Identify suitable and unsuitable areas for livestock production
- Prevent negative environmental impacts by a proper zoning and buffering of sensitive areas

2. Problem description and objectives

Macro level:

Distribution of livestock production at provincial/county level.

Objective: prevent pollution from livestock production by maintaining land-livestock balance

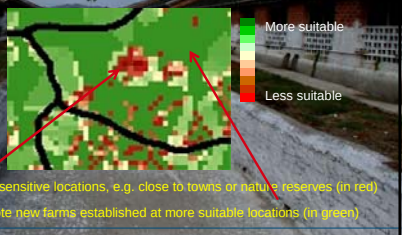


2. Problem description and objectives

Micro level:

Distribution of livestock production at local level.

Objective: prevent pollution of local concern (smell, disease risk) by maintaining safe distances from sensitive areas



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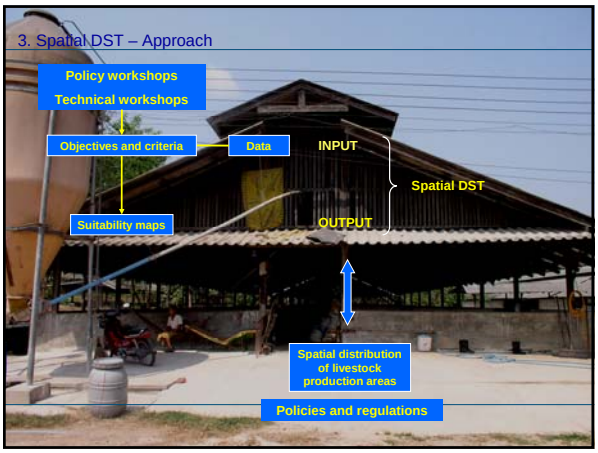
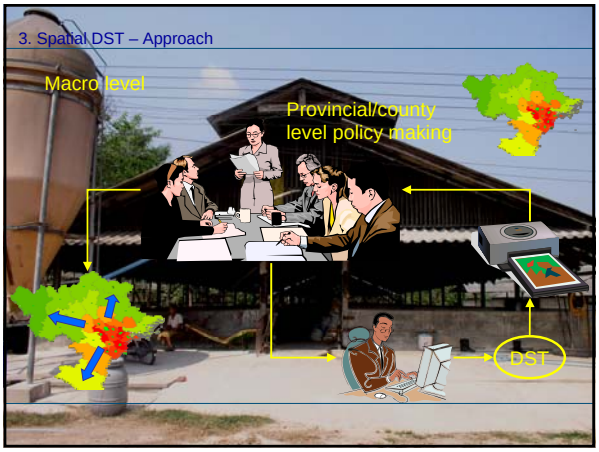
3. Spatial DST – approach
4. Key questions

3. Spatial DST – Approach



3. Spatial DST – Approach



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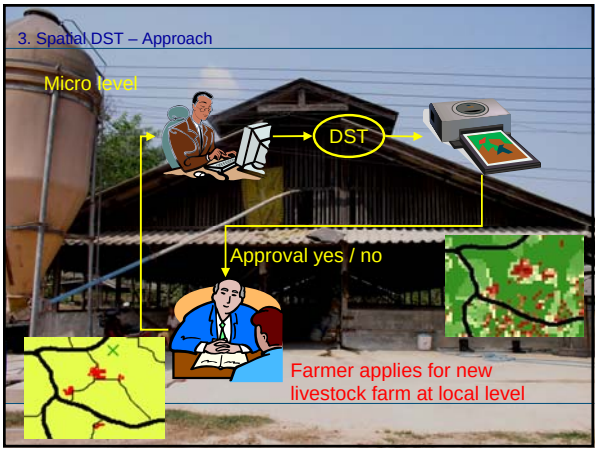

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4. Key questions

Key questions

1. *How does the decision making process (in which the spatial DST is to be used) looks like, and who should be involved?*
2. *Who will be using the spatial DST and its output?*
3. What are the (data) needs and requirements for a spatial DST?
4. How might the livestock sector develop in the next decade, and how to deal with that?
5. What are (new) relevant laws, regulations and incentives with respect to these developments?
6. What are relevant objectives for the spatial DST?

LWMEA
Spatial decision support tool (DST)

Gerrit J. Carsjens
Wageningen University, The Netherlands

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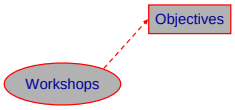
1. Problem description and objectives
2. Spatial DST – approach
3. Spatial DST – components
4. Next steps and time frame

3. Spatial DST – Components

Proposed components from AWI experiences



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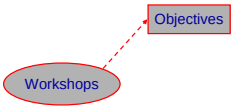
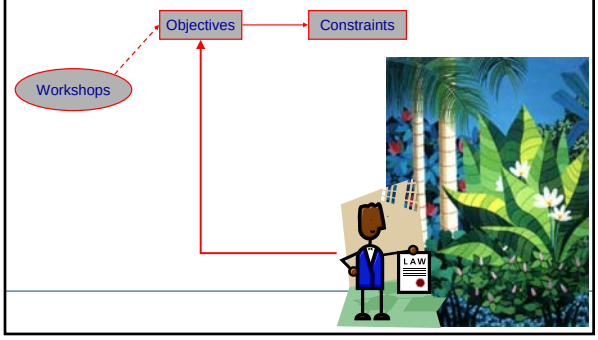
Proposed components from AWI experiences



Objectives – examples
Economic profitability
Environmental protection
Rural development
Public health
Poverty reduction
and other objectives …

3. Spatial DST – Components

Proposed components from AWI experiences



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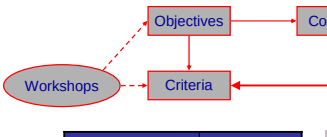
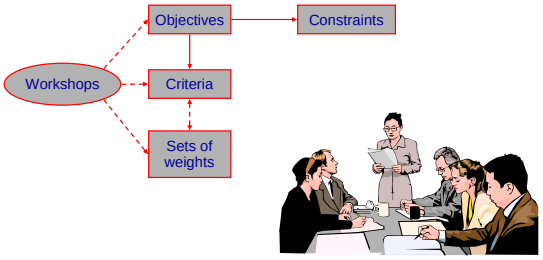
Proposed components from AWI experiences



Distance	Score
< 200 m	good
200 – 1000 m	average
> 1000 m	bad

3. Spatial DST – Components

Proposed components from AWI experiences



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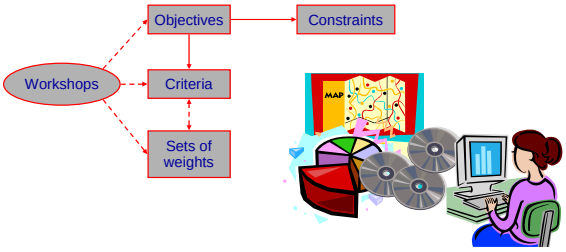

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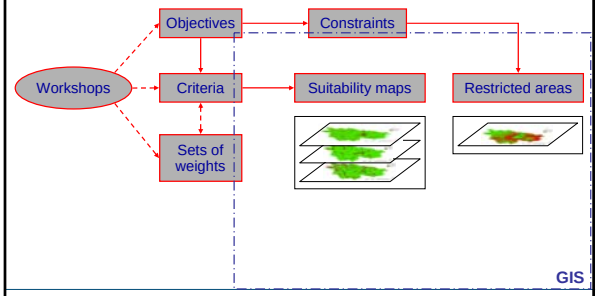

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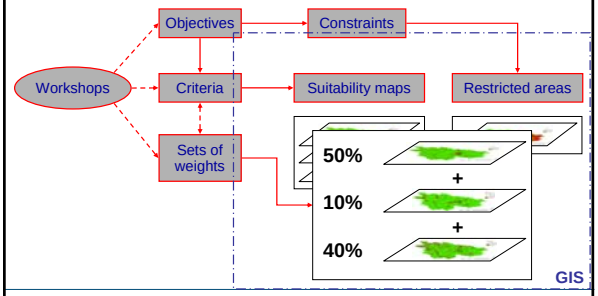

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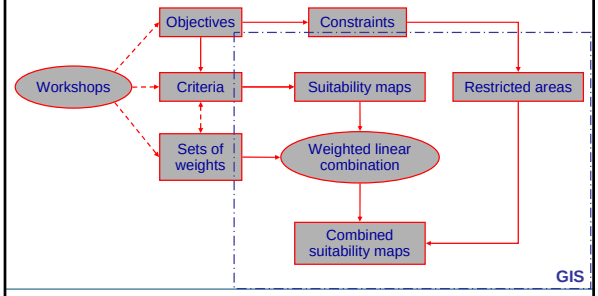
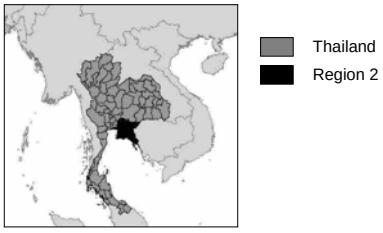


3. Spatial DST – Components

An example from AWI Thailand



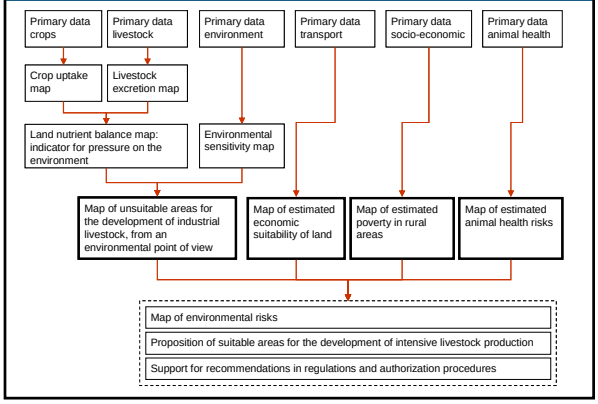
3. Spatial DST – Components

Criteria	Unit	Class 1 very low suitability	Class 2 low suitability	Class 3 medium suitability	Class 4 high suitability	Class 5 very high suitability	Restriction
Objective: **Economic profitability of pig production is maximised**							
Distance to feed mill	km			>50	10-50	<10	
Distance to slaughterhouse >10	km	>100		61-100		5-60	< 5
Distance to main road	km	>15		5-15		<5	
Poverty index	-		"progress"	"moderate"	"backward"		
Planned Foot and Mouth Disease free zone	-			elsewhere	buffer zone	free zone	
Human population density	indiv./km^2		<72	72-170	>170		
Current livestock density	pig/km^2		>1000	201-1000	0-200		
Objective: **Environmental impacts of pig production are minimized**							
Distance to inhabited area	m	<200	200-400	401-600	601-800	>800	
Distance to mangroves/wetlands	m	<200	200-400	401-600	601-800	>800	
Runoff risk	-	"very high"	"high"	"medium"	"low"	"very low"	"restricted"
Leaching risk	-	"very high"	"high"	"medium"	"low"	"very low"	"restricted"
Number of large pig and poultry farms in district	farm	>8	7-8	5-6	2-4	<2	
Current nutrient balance (P_2O_5)	%	>1	0.71-1.0	0.51-0.7	0.3-0.5	<0.3	
Current livestock densities	LU/km^2	>50	31-50	21-30	10-20	<10	
Distance to main road	m	<100	100-200	201-300	301-400	>400	
Current land use	-	"paddy"; "rice"; "agriculture useless"; "forest"; "lowland"; "bamboo"	"vegetables"	"field crops"; "grassland"	"fruit trees"; "orchards"	"plantations"	"protected areas"; "mangrove"; "wetland"

3. Spatial DST – Components

Criteria	Unit	class 1 very low suitability	class 2 low suitability	class 3 medium suitability	class 4 high suitability	class 5 very high suitability	Restriction
Objective: **Public and animal health are protected**							
Distance to inhabited area	km	<5		5 to 10		>10	"populated areas"; "water bodies"
Distance to streams and water bodies	m	0-100		101-500		>500	
Human population density	indiv./km^2	>200	151-200	101-150	51-100	<51	
Distance to slaughterhouse	km	<2		2-5		>5	
Planned Foot and Mouth Disease free zone	-	elsewhere	buffer zone			free zone	
Current livestock densities	LU/km^2	>80	61-80	41-60	21-40	0-20	
Leaching risk	-	"very high"	"high"	"medium"	"low"	"very low"	"restricted"
Distance to feed mill	km	<5		5-10		>10	
Number of large pig and poultry farms in district	farm	>5		3-5		0-2	
Poverty index	-		"backward"	"moderate"	"progress"		
Objective: **Rural development and poverty reduction are fostered**							
Distance to main road	km	>15		5-15		<5	
Poverty index	-	"backward"	"progress"		"moderate"		
Human population density	pers./km^2	>170		72-170		<72	
Current land use	-	"agriculture useless "; "coconut"; "lowland"; "forest" non planted	"irrigated rice";	"field crops"; "grassland"; "horticulture"; "fruit trees"; "mixed orchard"	"rain fed rice"; "plantations"; "planted forest"		"protected areas"; "mangrove; "wetland"
Planned Foot and Mouth Disease free zone	-		elsewhere	buffer zone		free zone	
Current nutrient balance (N_{total})	%	96-150		26-95		0-25	
Distance to slaughterhouse	km	>100		61-100		5-60	<5
Current nutrient balance (P_2O_5)	%	76-150		26-75		0-25	
Distance to feed mill	km			>50	10-50	<10	
Number of large pig farms in district	farm			1-4	5-8	>8	

3. Spatial DST – Components



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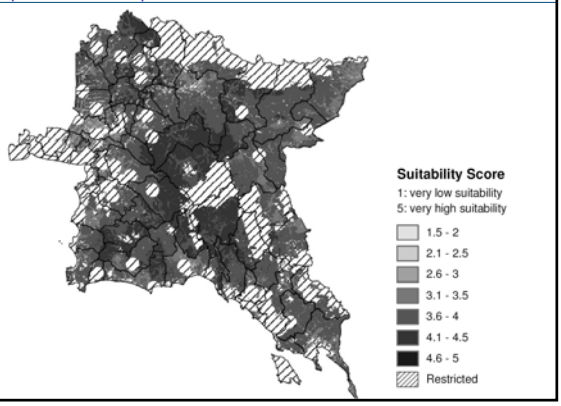

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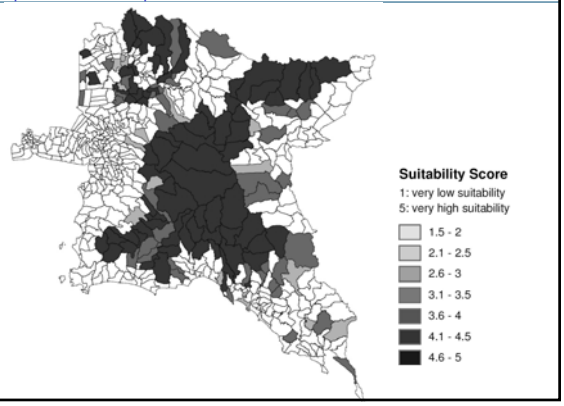
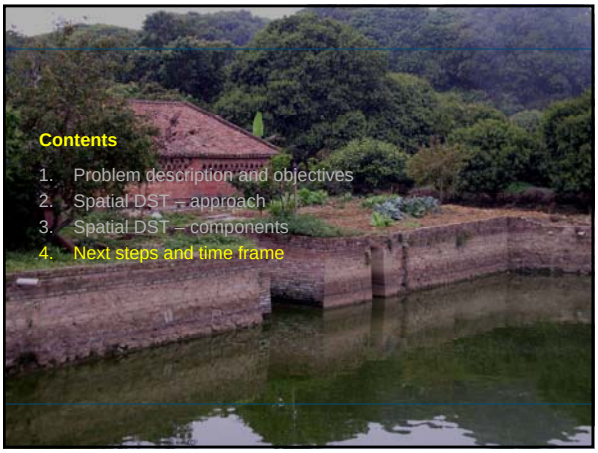


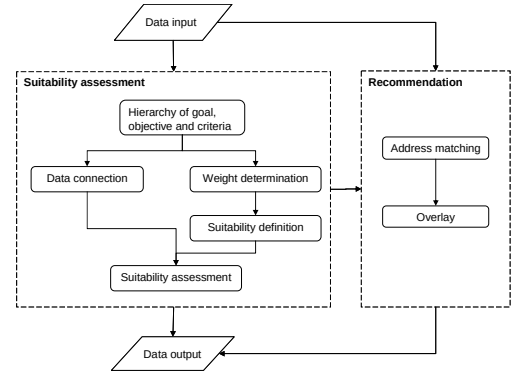


4. Next steps and time frame

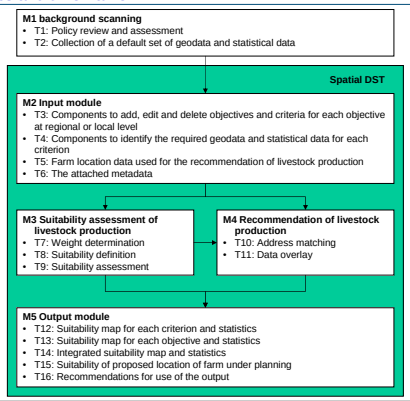
What has been done already?

1. Context of use identified for each country, including:
   - Decision making process for small farms
   - Decision making process for large farms
   - Potential users of the tool
   - Potential users of the output of the tool
   - Required statistical and geographical data
   - Data holders
   - Stakeholders to be involved in the policy workshop
   - Stakeholders/experts to be involved in the technical workshop
2. User requirements identified
3. Technical outline of the spatial DST written
4. Software developer identified
5. Relationships between spatial DST and policies discussed

4. Next steps and time frame



4. Next steps and time frame



4. Next steps and time frame

Next steps and time frame

Tasks (regional)	Time
1. Contracting software developer	July 2008
2. Writing the software architecture	1 month
3. Software coding draft version	3 months
4. Presentations and testing (regular feedback)	2 months
5. Software coding final version	3 months
6. Documentation and translation	2 months
7. Launch at training workshop	June 2009 …
8. Updating and maintenance	2009 -

4. Next steps and time frame

Next steps and time frame

Tasks (countries)	Time
1. Policy review and assessment	?
2. Collecting statistical and geo-data	Start now
3. Building statistical and geo-database	Start now