



DAMS AND SUSTAINABLE DEVELOPMENT



Lesson Learning Objectives

At the end of this lesson you should be able to:

- Discuss, using case study examples, the benefits and problems created by dams
- Explain reasons for unplanned outcomes of dam development
- Identify problems that arise during resettlement of people displaced by dams and describe how it could be improved
- Specify fisheries and environmental issues related to dams

Lesson Learning Objectives (Cont'd)

At the end of this lesson you should be able to:

- Explain the rights-and-risks approach to, and benefits of, public participation in decisions on dam developments
- Outline the intent of at least 3 strategic priorities in the World Commission on Dams report
- Describe how you would decide whether dam construction is justified in a specific location in the Mekong River Basin

Consider:

On this deceptively blue planet, less than 2.5% of our water is fresh, less than 33% of fresh water is fluid, less than 1.7% of fluid water runs in streams. And we have been stopping even these. We dammed our rivers at a rate of one/hour, and at a scale of 45,000 dams more than four storeys high

*Kader Asmal
Chair, World Commission on Dams (WCD)*

“Dams fundamentally alter rivers and the use of a natural resource, frequently entailing a reallocation of benefits from local riparian users to new groups of beneficiaries at a regional or national level”

“At the heart of the dams debate are issues of equity, governance, justice, and power - issues that underlie the many intractable problems faced by humanity”

*Kader Asmal
Chair, WCD*

Rivers, watersheds, and aquatic ecosystems are the biological engines of the planet..... (and) are the basis for life and the livelihoods of local communities

(WCD Report, 2000)

The debate about dams is a debate about the very meaning, purpose, and pathways for achieving sustainable development.....and the equitable distribution of costs and benefits

(WCD Report, 2000)

Sustainability Issues for Dams

Sustainable development means:

- overall improved human welfare
- equitably shared prosperity, lower poverty
- improved human health
- biodiversity maintained - no net loss of species
- ecosystems preserved
- nutritional level and commercial value of fisheries maintained

History of Dam Building

- First known dams built 3,000 B.C. on Nile, Tigris-Euphrates, Indus rivers
- From 1930s to 1970s large dam construction = development and economic progress
- Viewed as symbols of modernisation and man's ability to harness nature

Recent History of Dams

- In 1970s two or three large dams were commissioned every day
- Total investment in large dams: US\$2 trillion
- >50% of world rivers affected by dams
- >40 million people displaced by dams

Benefits from Dams

- Power generation - industrial expansion
- Irrigation
- Flood control
- Food security
- Local employment and skills development
- Rural electrification - improved living standards
- Expanded physical and social services
 - » roads, schools, hospitals

Dam Facts

- Dams have made an important contribution to human development, and the benefits have been considerable
- Technical, financial, economic performance of many dams are less than expected
- For many dams, the benefits have not been equitable compared with other options

(WCD Report)

More Dam Facts

- Too often benefits have been obtained at an unacceptable and unnecessary price to the environment, displaced people, and downstream communities
- Significant social and environmental costs often borne by poor people, indigenous peoples and other vulnerable groups

(WCD Report)

Symbolism of Dams in Sustainable Development

- Dam construction is based on the use of power:
 - » political
 - » economic
 - » social
 - » electrical
- Sustainable development must be founded on the equitable use of power

Specific Issues for Large Dams

- Many fall short of predicted water and electricity services and social benefits
- Delayed schedules and cost over-runs
- Irrigation may cause soil salinity, plans often not fulfilled, costs not recovered
- Power generation generally closer to, but still below, targets; variable economic performance
- Extensive negative impacts on rivers and watersheds - loss of ecosystems and species

Why There Have Been Problems with Large Dams

- Systematic failure to properly assess potential negative impacts and to implement adequate mitigation, including:
 - » resettlement and development programs for displaced people
 - » effects on downstream livelihoods
 - » personal suffering of displaced people
 - » effects on ecosystems due to reservoirs and rivers cut off from their source

Reasons for Problems

- Large dams often have been monuments to politicians, governments, aid agencies, dam builders
- Opportunities for personal gain can distort decisions
- Project momentum overcame concerns
- Project appraisal mainly technical with narrow cost-benefit analysis
- EIA, socio-economic impacts done too late, inadequately, or findings ignored

Other Reasons for Problems

- Incremental approach to mitigating individual impacts instead of thinking eco-systemically
- Cumulative effects assessment not done
- Reservoir sedimentation higher than predicted
- Landslides from mountainside erosion or earthquakes cause reservoir over-topping
- Leakage and evaporation from reservoirs
- Upstream water use by later projects

Missed Opportunities

- Early involvement needed of all whose rights may be affected and who bear the risks associated with a development to resolve competing interests and conflicts
- Unfavourable projects can be eliminated early, and best options agreed on by negotiating desired outcomes
- Inadequate follow-up evaluation of completed projects for environmental and socio-economic effects or profitability

Most Significant Issue

- Local poor, vulnerable, and indigenous people and future generations bear social and environmental costs and risks from large dams but often do not benefit from water and electricity services nor from social and economic improvements
- Urban dwellers, industry, and overseas companies most often reap the benefits

Resettlement Issues

- Forced resettlement can cause conflicts between settlers and original area residents:
 - » competition for new land, jobs, social resources
 - » lack of empowerment for settlers and residents
 - » dependency on government support
 - » loss of traditions and customs leads to loss of identity by settlers
 - » introduction of new traditions and customs by settlers can lead to resentment by original residents

More Resettlement Issues

- Local people may not be skilled or equipped for reservoir fisheries or dam construction
- Lose out to immigrants familiar with methods
- Underestimating these issues results in inflated benefit and profit predictions
- Poverty must be reduced by dam construction, not perpetuated or exacerbated
- Need passage of at least two generations to determine if resettlement is successful

Other Project-Affected People (OPAP)

- People who live:
 - » near dam site, township, roads, transmission lines
 - » in reservoir basin but do not need to be resettled
 - » downstream of the dam and are affected by irrigation projects and/or changes in river flows
- OPAP usually outnumber resettlers and hosts

Fisheries Issues

- Dams cut off up-river spawning sites from migrants downstream
- Fish ladders generally not effective with tropical fish
- Dams alter downstream:
 - » flow regime - volume, timing of peak flow
 - » water chemistry and physical characteristics - dissolved oxygen, temperature, turbidity, suspended solids, nutrientscausing conditions less suitable for native fish

Further Fisheries Issues

- Reservoir fisheries tend to peak early in life of dam, then decline
- Introducing exotic species to reservoirs can exterminate native fish
- Overall ecosystem impacts affect fish species and abundance - usually adversely

Other Environmental Issues

- Biomass not cleared before inundation can be a significant source of greenhouse gas emissions from reservoirs
- Reservoirs can increase incidence of diseases with water-based vectors, e.g., schistosomiasis, malaria, liver fluke
- Reduction in silt load in river downstream of dam can adversely impact fish habitat and agriculture
- Loss of forest, wildlife habitat, wetlands

Some Alternatives to New Large Dams

- Demand-side management; reduced consumption
- Supply-side management; improved efficiency of power production and distribution
- Small, distributed water and energy sources, local systems; appropriate technology
- Promotion of environmentally-friendly energy sources (e.g., solar, wind power)
- Run-of-river dams downstream of existing dam

Key Decision Points

BEFORE A DECISION IS MADE TO BUILD A DAM

- Needs Assessment: Verify the needs for water and energy services
- Selection of Alternatives: Consider the full range of options when choosing preferred development plan

Key Decision Points (Cont'd)

IF A DAM IS THE BEST OPTION

- Project Preparation: Verify that all agreements are in place before tendering construction contract
- Project Implementation: Confirm compliance before dam commissioning
- Project Operation: Adapt to changing circumstances

WCD Recommendations for Dams

NEED TO:

- Reconcile competing needs and entitlements to solve conflicts in development projects
- Clarify rights of legitimate stakeholders
- Involve those affected by the project in consultative process and negotiations
- Have a stake in decision making commensurate with exposure risk

More Recommendations

- If necessary, by modifying dam design, avoid severe and irreversible ecosystem impacts
- Provide water flows to meet environmental requirements, and mitigate or compensate for unavoidable ecosystem impacts
- On a rights and risks basis, establish a forum to enable all stakeholders, especially vulnerable and disadvantaged groups, to be consulted on all issues affecting them, and to participate in decisions in an informed manner

Yet More Recommendations

- Conduct a distribution analysis to see who shares the costs and benefits of the project
- Develop mitigation and resettlement arrangements that provide development opportunities and benefit sharing for displaced and adversely affected people
- Design and implement compliance requirements, and consequences for non-compliance

WCD Criteria and Guidelines

STRATEGIC PRIORITIES FOR DAMS IN PLANNING STAGE AND FUTURE DAMS

- Gaining public acceptance
- Comprehensive options assessment
- Addressing existing dams
- Sustaining rivers and livelihoods
- Recognising entitlements and sharing benefits
- Ensuring compliance
- Sharing rivers for peace, development, security

Gaining Public Acceptance

CRITERIA AND GUIDELINES

- Stakeholder analysis
- Negotiated decision-making processes
- Free, prior and informed consent
 - » Recognise rights of those affected - especially tribal and indigenous peoples, women, and other vulnerable groups
 - » Informed participation by all such groups in decision processes with their consent

Comprehensive Options Assessment

CRITERIA

- Strategic and project-level impact assessment for environmental and socio-economic issues
- Multi-criteria analysis
- Life-cycle assessment
- Greenhouse gas emissions
- Distribution analysis of projects

Comprehensive Options Assessment (Cont'd)

GUIDELINES

- Assess all alternatives to a dam during feasibility studies, and continue through planning, development, and operation
- Social and environmental aspects have same weight as economic and financial factors

Addressing Existing Dams

CRITERIA AND GUIDELINES

- Ensure operating rules reflect social and environmental concerns
- Improve reservoir operations
 - » Circumstances change with time - re-examine existing dam operations, impacts, mitigation measures, obligations

Sustaining Rivers and Livelihoods

CRITERIA AND GUIDELINES

- Baseline ecosystem surveys
- Environmental flow assessment
- Maintaining productive fisheries
 - » Equitable human development and welfare of all species depend on understanding, protecting, and restoring river basin ecosystems

Sustaining Rivers and Livelihoods (Cont'd)

GUIDELINES

- Priorities should be assessment of options, avoidance of impacts, minimization of harm to the health and integrity of the river system, good site selection and project design
- Downstream ecosystems and communities may be maintained by release of environmentally-tailored flows

Recognizing Entitlements and Sharing Benefits

CRITERIA

- Baseline social conditions
- Impoverishment risk analysis
- Implement the mitigation, resettlement, and development action plan
- Project benefit sharing mechanisms

Recognizing Entitlements and Sharing Benefits (Cont'd)

GUIDELINES

- Negotiations with those adversely affected must result in mutually agreeable and legally enforceable mitigation and development
- Successful mitigation, resettlement, and development are responsibilities of the State and the developer
- Livelihoods of affected people should improve promptly

Ensuring Compliance

CRITERIA

- Establish compliance plans
- Independent review panels for social and environmental matters
- Post performance bonds
- Set up trust funds
- Make a pact regarding integrity

Ensuring Compliance (Cont'd)

GUIDELINES

- Governments, developers, and operators must meet their commitments
- All must comply with relevant regulations, criteria, guidelines, and agreements at all stages of development and operation
- Use of incentives and sanctions can aid response to changing circumstances

Sharing Rivers for Peace, Development and Security

GUIDELINES

- In transboundary river systems, dams and water diversions require co-operation of all affected States
- States must agree to use and manage resources to promote regional cooperation and peaceful collaboration
- Shift from allocating water resources to sharing the river system and its associated benefits

Concluding Thoughts

Important points to remember are:

- The need to re-think freshwater resources management is one of the greatest challenges facing the world in the new century
- 'Business as usual' is neither feasible nor desirable
- Must find ways to share water resources equitably and sustainably, meeting the needs of people, the environment, and economic development

Concluding Thoughts (Cont'd)

Additional points to remember are:

- Future for water resources development is in participatory decision making using a rights-and-risks approach
- Social and environmental effects of dams must be given equal weight to economic factors
- Governments must screen out inappropriate projects earlier, and facilitate integration across sectors within a river basin

Concluding Thoughts (Cont'd)

More points to remember are:

- Open, meaningful participation must be implemented at all stages leading to freely negotiated outcomes
- Developers must be held accountable by contractual commitments to properly mitigate social and environmental impacts
- Improve compliance by independent review
- Dam proponents must learn lessons from the past and not repeat them

Concluding Thoughts (Cont'd)

Some final points to remember are:

- Focus needs to be on:
 - » assessment of all options, including 'no build'
 - » opportunities to improve performance
 - » addressing legacies of existing dams
 - » equitable sharing of benefits in sustainable water resources development