CHAPTER 8
WATERSHED MANAGEMENT EXPERIENCES IN GTZ-SUPPORTED PROJECTS IN INDIA

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BACKGROUND

About US$400 million is spent on watershed development programmes in India each year. Over the last decade, these programmes have worked to alleviate poverty, build up sustainable livelihoods and rehabilitate degraded lands. It is estimated that international donors provide about US$100 million of assistance each year towards rehabilitating India's watersheds. Of this, the Federal Republic of Germany contributes about 15 million euros per year (US$18 million). A substantial part of these funds goes for environmental protection and sustainable natural resource management. German support for watershed management is linked to its overall support for poverty alleviation and environmental protection, with poverty alleviation as the main focus of its support to watershed-related projects. The rehabilitation of the half of India's degraded land (170 million ha) located in undulating semi-arid areas is a priority. German Agency for Technical Cooperation (GTZ)-supported projects aim to apply socio-technical solutions for sustainably rehabilitating land and other natural resources in order to enhance productivity and reduce poverty.

WATERSHED MANAGEMENT IN INDIA

Community-based watershed management has become the guiding principle for rehabilitating natural resources in India's rural areas. Natural resource management in India has evolved from a purely technical, top-down approach in the 1970s, to the current decentralized participatory approach (Box 1). The Ministry of Rural Development's Hariyali guidelines on watershed development (MoRD, 2003) have given village-level local government – the panchayati raj institutions – a pivotal role in managing natural resources. They now have the responsibility for managing local watershed projects.

BOX 1

WATERSHED PROJECTS IN INDIA, 1970S TO 2003

1970s: Target area/technical approach, externally imposed. For example, Drought-Prone Area Programme and Desert Development Programme.

1980s: Target area approach with some community involvement. Mainly integrated watershed development projects such as the Integrated Wastelands Development Programme. Also Social Forestry.

1990s: Joint forest management, watershed and eco-development projects. Foreign donors provided much support to a participatory approach working with non-formal village bodies.

2000s: Watershed Development and Swajaldhara Rural Drinking-Water Programme. These projects take a participatory approach, promote livelihoods and work through panchayati raj institutions (PRIs). They aim to empower PRIs for planning, implementation, and monitoring and evaluation of micro-plans. In 2003 the Hariyali guidelines for watershed development were updated to involve PRIs in watershed management.

GTZ-SUPPORTED PROJECTS

GTZ is one of the main international technical cooperation agencies supporting watershed development in India. Its recent support has been directed towards natural resource management-based panchayat micro-plans, impact monitoring, environmental services based on upstream and downstream linkages, and climate change in watershed management. It has supported watershed management projects in eight Indian states across a range of geographical and socio-demographic conditions. These projects have been in Rajasthan, Uttaranchal, Uttar Pradesh, Tamil Nadu, Andhra Pradesh, Jharkhand, Himachal Pradesh and Maharashtra. Box 2 describes five of the main projects.

BOX 2

GERMAN-SUPPORTED WATERSHED PROJECTS IN INDIA

Indo–German Bilateral Project: Watershed Management (1989–2005) – provides advisory and financial support for integrated watershed management and is focused on capacity building, monitoring and evaluation.

Indo–German Watershed Self Help Program (WOTR) – promotes watershed self-help programmes, focusing on building capacity of NGOs and community-based organizations. Current phase runs from 2001 to 2004.

Indo–German Changar Eco-Development Project – aims to reduce environmental degradation by focusing on building capacity of village development committees/panchayati raj institutions, natural resource development, building capacity of local animators, and building capacity of future institutions for programmes such as Himachal Pradesh Eco-Development Society as a knowledge centre. The first project phase ran from 1994 to 1999, with the current phase II planned for 1999 to 2006.

Reorganization and Strengthening of Watershed Training Institutes in Maharashtra (2002-2005). This initiative is working to reorganize and strengthen Maharashtra state's Water, Soils and Watershed Management Training Institute.

Capacity Building and Strengthening of Decentralized Watershed Management (2003-2007) – aims to build the capacity of all relevant watershed management actors through training and other kinds of capacity building.

GTZ is working with many government bodies and NGOs in watershed management. At the central government level it has worked with the Ministry of Agriculture and the Ministry of Environment and Forests; and at the state level with the Ministry of Agriculture (Government of Maharashtra), the government of Himachal Pradesh and others. The links with government organizations have allowed experiences to be shared with policy-makers. Project monitoring and evaluation has allowed for lessons to be learned. These lessons have been disseminated at the regional, national and international levels, and supplemented with watershed development-related publications.

The main NGOs and semi-governmental bodies it has worked with are Maharashtra's Watershed Organization Trust and the Himachal Pradesh Eco-Development Society. It has also worked closely with the German consulting company, RODECO Consulting.

GTZ APPROACH TO WATERSHED MANAGEMENT

GTZ defines watershed management as the process of guiding and organizing land use and the use of other resources in a watershed in order sustainably to provide desired goods and services to the people without adversely affecting soil and water resources. This definition recognizes the interrelationships among land use, soil and water, the linkages between uplands and downstream areas, and the numerous types of stakeholders.

GTZ's approach to watershed management is built around encouraging people's participation, on the premise that a watershed development project can become sustainable only when local people own and maintain project-created assets. Across India, watershed development is now planned to happen through local elected panchayati raj institutions.

GTZ supported project's work to:
- develop the capacity of human resources, local communities and local institutions;
- effect management of natural resources – soil, land, water and forests;
- improve farming systems through crop management, pasture and fodder development, livestock management and organic farming;
- build sustainable rural livelihoods by adding value to farm and non-farm products and services;
- manage conflicts such as among social groups and between upstream and downstream users; and
- establish backstopping mechanisms such as linkages with line departments and markets.

A key feature of the GTZ approach to watershed management is working to manage the many, often competing, demands on a watershed, such as the water needs of agriculture, households, industry, livestock, forests, wildlife and tourism. Its projects also advocate for a universal policy that harmonizes work across human and natural resource management sectors. They promote the decentralization of decision-making, monitoring and evaluation, and capacity building. Decentralization is promoted through:
- the decentralized development of village water resources;
- self-help resource management planning and implementation at the village and ward levels;
- developing decentralized knowledge centres; and
- building up the capacity of local animators.

Monitoring and evaluation is being promoted through using:
- hydrological monitoring and decision support systems;
- remote sensing and Geographic Information Systems (GIS);
- guidelines for impact assessment; and
- participatory impact monitoring with the direct involvement of communities.

The capacity of government organizations, NGOs, community-based organizations and panchayati raj institutions is built by:
- strengthening and developing their ability to manage watersheds in a participatory way that promotes self help;
- building up their knowledge about soil and water harvesting and conservation techniques;
- promoting savings and credit programmes and micro-enterprise development;
- establishing linkage mechanisms;
- promoting alternative sources of energy; and
- developing and testing ways of improving crop cultivation, agroforestry, horticulture, livestock and fodder development, and community forestry.

LESSONS LEARNED

GTZ's experiences in India suggests that the best approach to watershed management is by working in a participatory way, using sound local technologies and sharing the costs and benefits. In line with the government's policy, GTZ's watershed projects take revenue villages or panchayats as the unit of implementation and then work with local stakeholders to plan, design, implement and monitor interventions, and prioritize activities that strengthen local livelihoods. This all helps to build a sense of local ownership.

The use of sound locally adapted technologies that are technically mature and have been tested makes projects attractive to local people. Such technologies should be selected with farmers or user groups and must have low complexity, risk and initial costs. Ideally, they should demonstrate visible positive effects, including profitability, within short gestation periods. As far as possible, projects should aim to promote the sharing of costs and benefits equitably between resource-poor people and better-off community members, and between upstream and downstream users.

GTZ's experiences in India show the importance of forging good institutional linkages when implementing a project. There is a crucial need for long-term supporting actors who can provide technical backstopping after project support has ended in order to avoid situations in which the impacts of promising innovative projects are short-lived or limited. GTZ therefore has the policy of phasing-out temporary organizational structures and services that have been created to run projects. The aim is to institute post-project networking, technical backstopping and linkages among permanent stakeholders in order to continue the processes and positive impacts achieved by the project. Figure 1 shows all the main institutional links in a watershed management project, from the state down to the village level. The end of a project is likely to see the removal of the project implementing and coordinating bodies and offices, leaving NGOs working with government agencies and local elected bodies to carry on project works and ensure project sustainability.

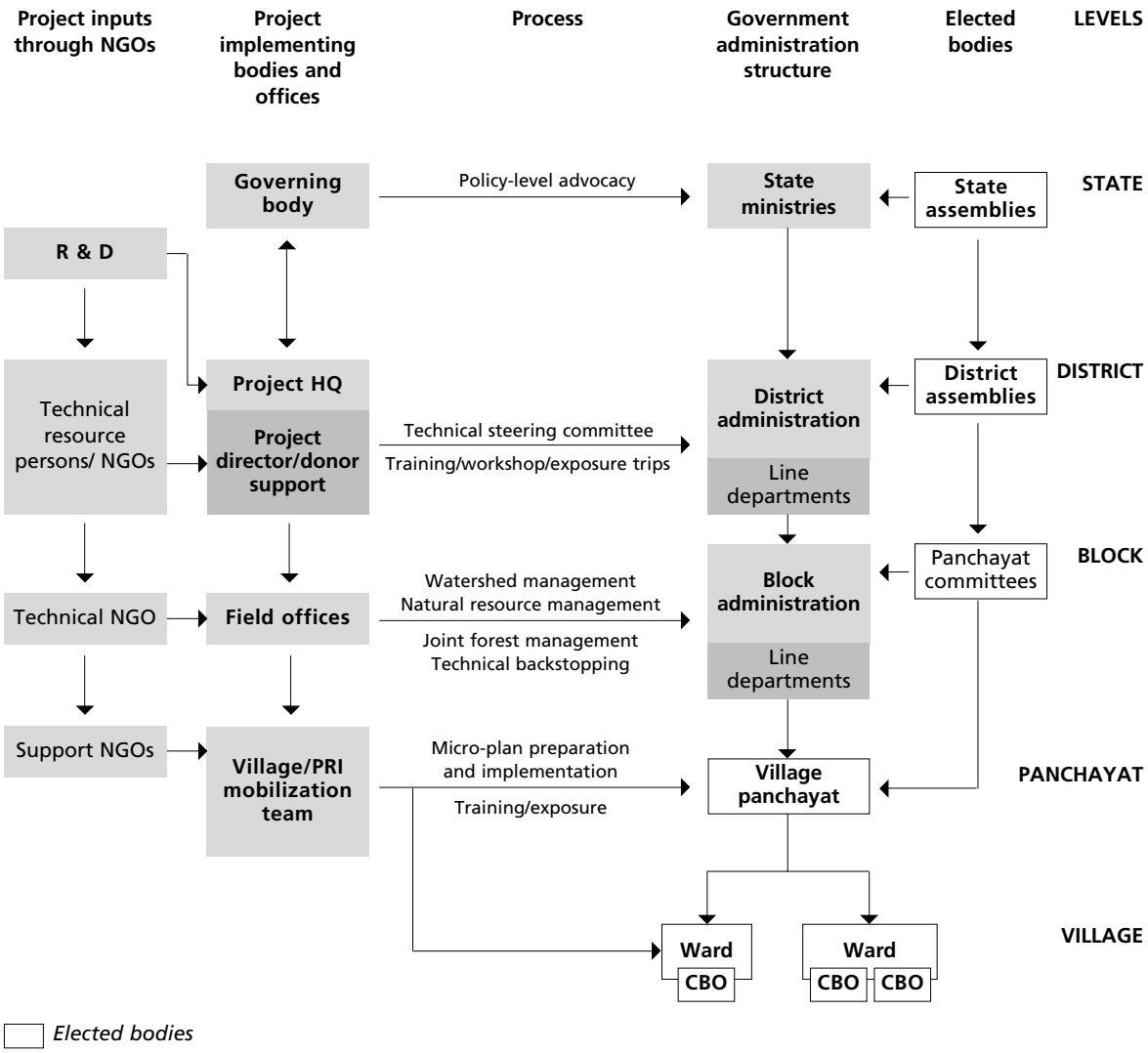
CONSTRAINTS

Sound watershed management is constrained by the following factors.

Building and strengthening competent organizations. It is difficult to put in place a system for continuously building up the capacity of government organizations, NGOs and community-based organizations. This is needed, as the technical competence of most social organizations is weak. Many also have inadequate focus on gender issues and difficulties in adequately attending to issues of equity, operation, maintenance and management once project funding ends.

Mobilizing finances. Usually, the budget provided by the government is insufficient to carry out adequate watershed management work. Projects tend to create dependency on external funding. Maintaining investments is a great challenge, as watershed development does not attract private investors. More effort needs to be put into mobilizing local financial resources.

FIGURE 1
Institutional set-up for managing natural resources



Monitoring and evaluation. The main problems for monitoring and evaluating projects are the lack of baseline data, impact data and common monitoring guidelines. Wherever participatory impact monitoring is introduced it is often difficult to sustain it post-project.

Decentralization of government schemes. The future role of state governments and line departments in watershed management is not clear. In particular, technical and financial responsibilities among state government departments, PRIs and project implementation agencies are unclear. Other challenges include:

- the lack of horizontal and vertical convergence and coordination, such as the need to converge panchayat micro-plans and village resource management plans;
- frequent failures to reach the resource-poor and women;
- adjusting watershed management for the distinctive conditions of Himalayan areas; and
- the lack of directives and mechanisms to ensure line department support for decentralized planning and implementation.

Distribution of costs and benefits. The equal distribution of costs and benefits between landless and resource-poor people and better-off farmers needs intensive facilitation. In addition, up to now, the sharing of benefits between upstream and downstream users has not happened. The rights of users to forests and common lands need to be made clearer.

FUTURE THEMES

The main emerging themes that need attention in watershed management in India are:

- watershed management and climate change;
- improving horizontal and vertical coordination among the various schemes promoting integrated resource management;
- improving approaches and structures;
- avoiding conflict and discrimination;
- identifying new mechanisms for financing watershed management;
- making landless and resource-poor people benefit more;
- distributing costs and benefit, including the sharing of benefits between upstream and downstream users based on the environmental services provided;
- co-financing between local implementing agencies and donors; and
- building linkages, including to improve coordination among international donors.

Environmental protection and sustainable natural resource management will continue to be a focal point of development cooperation between India and Germany. Future support is planned for disseminating successful approaches through a national intersectoral programme. The focus will be on building the capacity of training institutes to train facilitators who work with users to develop participatory watershed management further.

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CHAPTER 9
WATERSHED MANAGEMENT IN INDONESIA

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BACKGROUND

Formal watershed management began in Indonesia during the 1970s in response to massive flooding of the city of Solo in Central Java. Experiences since then have shown how, in a developing country such as Indonesia, environmental issues are foremost and need to be addressed by many kinds of development projects. The challenge in watershed management is to protect upland watersheds. These areas provide many local, regional and countrywide benefits. The key is to promote development strategies that help rural low-income groups without environmentally and economically destructive forest removal.

Forest and land degradation is directly linked to food security (FAO, 1985). The loss of soil and productive capacity in uplands is usually directly evident, but downstream effects may not be. Sedimentation and excessive stream flow from the uplands often disrupt downstream irrigation and hydropower generation facilities. This has serious social and economic implications.

Figure 1 illustrates the causes and effects of the degradation of watersheds in Indonesia and elsewhere. Soil erosion, sediment-filled reservoirs, frequent flooding, polluted water and drinking-water shortages are the results of unsuccessful land and forest protection and rehabilitation. The causes range from poor law enforcement to lack of job opportunities.

The main recent developments have led on from the Ministry of Forestry's (MoF's) new guidelines on watershed management planning (MoF, 2000a), forest and land rehabilitation (MoF, 2000b) and the development of micro-catchment models (MoF, 2000c).

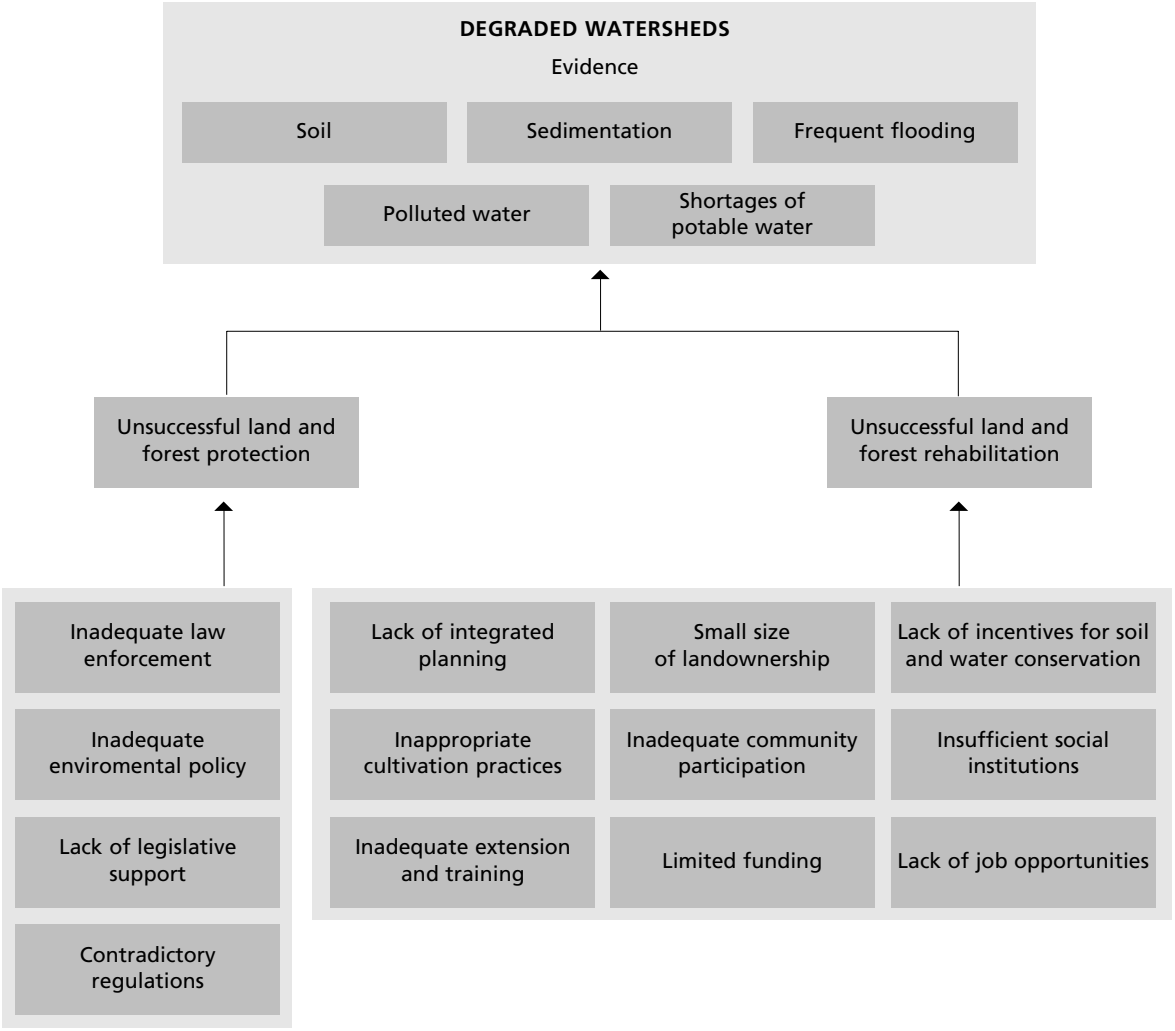
IDENTIFYING PRIORITY WATERSHEDS

Indonesia has about 470 watersheds, which vary in size and condition. Many are degraded to some extent. The Indonesian government has set about prioritizing those watersheds that most need management interventions. This began after the MoF in 1999 issued a decree to carry out this work (Ministerial Decree 284/1999). In response, a systematic and scientific way was developed to decide which watersheds are most in need of interventions. An analytical hierarchy process was developed (Figure 2).

The process takes into account the range of main land use, hydrology, social, economic and institutional factors. Several sub-factors were identified within each factor, and a way of

measuring each was developed or identified (see column 3, Figure 2). For example, the relative hydrologic importance of a watershed is accounted for by measuring its discharge levels, sediment content, pollutant content and sediment delivery ration. A ranking scale was developed for each of the column 3 indicators to give a score for each sub-factor. The final overall score is arrived at by weighting the relative importance of each factor and sub-factor. This process takes the factor of land use as the most important, accounting for 40 percent of the total weighting, within which land cover accounts for 20 percent and land suitability 10 percent of the total score.

FIGURE 1
Causes of watershed problems in Indonesia



The relative weightings were agreed on in a democratic and consultative way as the process was being developed. The range of stakeholders, including government officials, watershed professionals and academics, decided on the relative importance of the various biophysical, socio-economic and other factors that act on a watershed and govern the benefits to be realized by interventions. This helped to overcome disciplinary bias where, for example, a hydrologist would tend to assign most importance to hydrological factors.

It took more than a year to collect all the data for the 470 watersheds. This work was carried out by the 31 regional watershed management centres (BPDAS – previously BRLKT). It took another year for the central office of the Directorate General for Land Rehabilitation and Social Forestry (RLPS – previously RRL) to process and check the data and assign a ranking to each watershed.

Watersheds with a score of between 100 and 200 were categorized as priority III, 201 to 300 as priority II, and more than 300 as priority I. The priority I-type watersheds are those in greatest need of attention. This exercise found 60 priority I watersheds, 232 priority II watersheds, and 178 priority III watersheds. The ministry plans to review the status of its watersheds every five years.

The main problem in carrying out this exercise was the availability of data. Where data were not available, the parameter could not be defined exactly and was estimated. About 60 percent of watersheds had complete data – mostly those in Java and Sumatra.

As an illustration, Lake Toba watershed on Sumatra is one of the 60 priority I watersheds. It is characterized by large areas of degraded land, severe soil erosion, high population pressure and a large investment in building a multipurpose dam. It is a priority 1 watershed because, among other things, the zone has a large dam in an area where increasing population pressure on natural resources is leading to increasing land degradation. In contrast, Bintan Island watershed is a priority III watershed because it has less degraded forest and land, much less soil erosion, low population pressure and no large investments in infrastructure.

This kind of categorization has been very useful to focus attention on the areas most in need of watershed management interventions. It could be used in other countries better to direct watershed management investments. The precondition is to have a relatively complete resource database.

FOREST AND LAND REHABILITATION

The rehabilitation of degraded forests and lands is a priority for the Indonesian government. Reforestation is carried out by developing plantation forests and by enrichment planting in degraded natural forests. This is mostly done by private concession companies and State companies. Logging concessions are usually granted on condition that the company reforests the area afterwards. However, many concessionaires fail to replant areas they log. Only a few have successfully established plantation forests for industrial timber production. The MoF's Directorate General of Forest Production Development coordinates this work.

Afforestation and reforestation outside of concession areas is planned by the MoF's Directorate General of Land Rehabilitation and Social Forestry (DGLRSF). So far, most forest and land rehabilitation has taken place in critical watersheds (priority I). A specific hierarchy plan of each watershed has been formulated by regional watershed management centres. These plans are made up of a macro-plan for the whole of a watershed, a technical plan for the rehabilitation of land and soil conservation by sub-watersheds, and detailed technical designs for reforestation and land rehabilitation by site. The plans are formulated with framework analysis to consider biophysical and socio-economic factors.

FIGURE 2

Analytical hierarchy process for prioritizing watersheds

FACTORS	SUB-FACTORS	INDICATOR	RANKING SCALE	NOTES
A. LAND USE (40)	1. Land cover (20)	$LCI = \frac{PVL}{Watershed\ Area} \times 100\%$	LCI > 75% (good) LCI = 30 – 75% (fair) LCI < 30% (bad)	LCI = land cover index PVL = permanent vegetated land Source: land cover and land use map
	2. Land suitability (10)	$LS = \frac{SA}{Watershed} \times 100\%$	LS > 75% (good) LS = 40 – 75% (fair) LS < 40% (bad)	LS = land suitability SA = suitable area Source: land suitability map
	3. Erosion index (EI) (7)	EI = x100%	EI ≤1 (good) EI > 1 (bad)	Erosion calculation based on guidelines for field design of land rehabilitation and soil
	4. Land management (3)	Crop type (C) and soil conservation practices (P)	C x P = < 0, 10 (good) C x P = 0,10 – 0,50 (fair) C x P = > 0,50 (bad)	C & P value is from table in LRSC guideline, 1998
B. HYDROLOGY (20)	1. Discharge (8)	a. $WRC = \frac{Q\ max}{Q\ min}$	WRC < 50 (good) WRC = 50 -120 (fair) WRC > 120 (bad)	Q= water discharge WRC = water regime coefficient
		b. $CV = \frac{Sd}{Q\ average} \times 100\%$	CV < 10% (good) CV > 10% (bad)	CV = coefficient of variation Sd = standard deviation
		c. $WUI = \frac{Water\ need}{Water\ supply}$	The lower the WUI the better	WUI = water use index
	2. Sediment content (8)	Sediment concentration (S_C)	The lower the S_C the better	Based on data from stream flow monitoring stations
	3. Pollutant content (4)	Biophysical and chemical concentration	Based on valid standard	Standard in Government Regulation No. 20/1990
	4. Sediment delivery ratio (2)	$SDR = \frac{Total\ sediment}{Total\ erosion}$	SDR < 50% (normal) SDR 50 – 75% (less than normal) SDR > 75% (degraded)	SDR = sediment delivery ratio Field measurement, calculation, data from stream flow monitoring station

FACTORS	SUB-FACTORS	INDICATOR	RANKING SCALE	NOTES
C. SOCIAL (20)	1. Individual concern (10)	Positive individual conservation activities	Present/absent	Data from related institution
	2. People's participation (7)	Partecipatory percentage of people in group activities	> 70% (high) 40 – 70% (medium) < 40% (low)	Observation data or report from related institution
	3. Population pressure (3)	Population pressure index (PPI) $PPI = z \times \frac{f\ Po\ (1 + r)}{L}$	PPI < 1 low PPI = 1 – 2 medium PPI > 2 high	t = time in 5 years ź = agricultural land for proper life of each farmer f = proportion of farmers against population in watershed Po= population in year 0 L = agricultural land area r = population growth per year
D. ECONOMIC (10)	1. Dependency on agriculture (4)	Actual Erosion Tolerable erosion	> 75 % (high) 50 – 75 % (medium) < 50 % (low)	Calculated/household/year or from related institution data
	2. Income (2)	Agricultural contribution to family income	Statistic Centre Bureau	Data from related institution
	3. Land productivity (2)	Family income per year	Decrease/unchanged/increase	Data, Central Bureau of Statistics
	4. Environmental merit (2)	- Production/ha per year - Internality from externality - Cost sharing	Present/absent	In the tax form or contributions for environmental fund
E. INSTITUTIONAL (10)	1. Role of local institutions (4)	Role of local institution in watershed management	Have a/no role	Observation data
	2. Government support to local communities (2)	Government intervention	High/medium/low	Observation data
	3. CISS (2)	Conflict	High/medium/low	CISS = coordination, integration, synchronization, synergy.
	4. Group business activities (2)	Number of business units	Increase/unchanged/decrease	From related institution

The MoF began working on forest and land rehabilitation in the 1970s. These activities are now coordinated by the Directorate General of Land Rehabilitation and Social Forestry and its regional watershed management centres. There are 31 of these centres, and their activities focus on upper watersheds where most critical lands are found. They work to rehabilitate land and forests so as to increase vegetative coverage, increase the infiltration of water into the soil to reduce direct runoff, reduce soil erosion and sedimentation, and increase farmers' incomes. These centres work with local people in priority watersheds and sub-watersheds to reforest protected forests, establish community forests on private lands, promote agroforestry and soil and water conservation techniques, such as terracing, grass barriers and alley crops, and install check dams, gully plugs, drainage improvement and infiltration wells.

The rehabilitation of degraded forest and land in all of Indonesia's 470 watersheds is not possible without people's participation. This participation is crucial for combating forest and land degradation because the rate of degradation – about 2 million ha per year – is faster then the rate of rehabilitation – about 0.6 million ha per year. Therefore, the government has introduced an awareness programme to encourage local people to plant trees, conserve forests and promote soil and water conservation.

NATIONAL MOVEMENT ON FOREST AND LAND REHABILITATION

The National Movement on Forest and Land Rehabilitation was launched by the Indonesian President on 21 January 2004 in Yogyakarta, Indonesia. The stage had been set for this when the three ministries of Social Welfare, Economy, and Politics and Security introduced a collective regulation in March 2003. This has encouraged coordinated efforts to protect, rehabilitate and replant forest land.

This movement is to be implemented in 21 of Indonesia's most degraded watersheds and ten priority II watersheds, over a total of about 3 million ha. The aim is to rehabilitate the forests in these areas over five years using a US$1.4 billion reforestation fund. This programme started in 2003, with target area coverage as shown in Table 1.

TABLE 1
Target coverage of National Movement on Forest and Land Rehabilitation

Phase	Year	Area (ha)
I	2003	300 000
II	2004	500 000
III	2005	600 000
IV	2006	700 000
V	2007	900 000
	Total	**3 000 000**

Reforestation programmes by private forest concession companies have been largely unsuccessful owing to lack of control and a failure to address local communities' needs. Regreening initiatives carried out by local people have also been unsuccessful owing to lack of planning. The national movement aims to integrate the work of the government and local people, with central government providing seedlings while local government and local people plant the seedlings in the field.

The programme is promoting the planting of desirable tree species. It works by the central government coordinating activities and the local government supervising implementation. It is promoting public and private participation and harnessing the contribution of the army to rehabilitate remote forests and land areas. Monitoring and evaluation is being done using satellite images.

LOANS FOR WATERSHED CONSERVATION

Improved upland agriculture, community forest and agroforestry have been promoted under several schemes. One of the most successful was introduced in the 1990s to give out low-interest loans to be repaid over five years. The scheme is targeted at small-scale and poor farmers living in upland watersheds. The credit is meant for improving soil conservation structures such as terraces and control dams. In general, poor farmers cannot build these themselves because of the expense involved. This initiative will have benefits both to the upland and downstream parts of the watershed.

In most parts of Indonesia, this credit scheme has been successful, creating conservation farming systems and putting in place soil and water conservation measures. However, in some places its implementation has not been sustainable. Some farmer groups have failed to repay loans partly because no fines were imposed for failing to meet repayments. In addition, some farmers spent the money for measures other than conservation purposes. The main problems have been related to the top-down nature of the scheme and the lack of control from local, provincial and central government and the bank. The scheme has been postponed and is being evaluated to improve its control mechanisms. The government is optimistic about introducing a revised scheme to help the poor in upland areas.

MICRO-CATCHMENTS

Policy-makers need facts and figures on the extent of the problems of watershed degradation and the effectiveness of various measures to reverse it. This information can be generated from micro-catchment demonstration plots that represent forest and land rehabilitation and social forestry activities. The ideal schematic flow of policy formulation is illustrated in Figure 3, with policy flowing from the micro-catchment level on to the sub-watershed, watershed and basin levels, to influence national policy. At the micro-catchment level, the left side of Figure 3 represents the "ideal" conditions (a demonstration site), and the right side the actual condition of micro-watersheds in the same sub-watershed. Policy should be made by aiming to take measures that transform the actual situation into the "ideal" condition, from the micro-watershed level through to national policy in a bottom-up way.

In 2004, the Directorate General for Land Rehabilitation and Social Forestry (DGLRSF) plans to set up such models at the micro-catchment level in its 31 regional watershed management centres, in order to provide data and information and to act as demonstration plots, field laboratories and ecotourism centres.

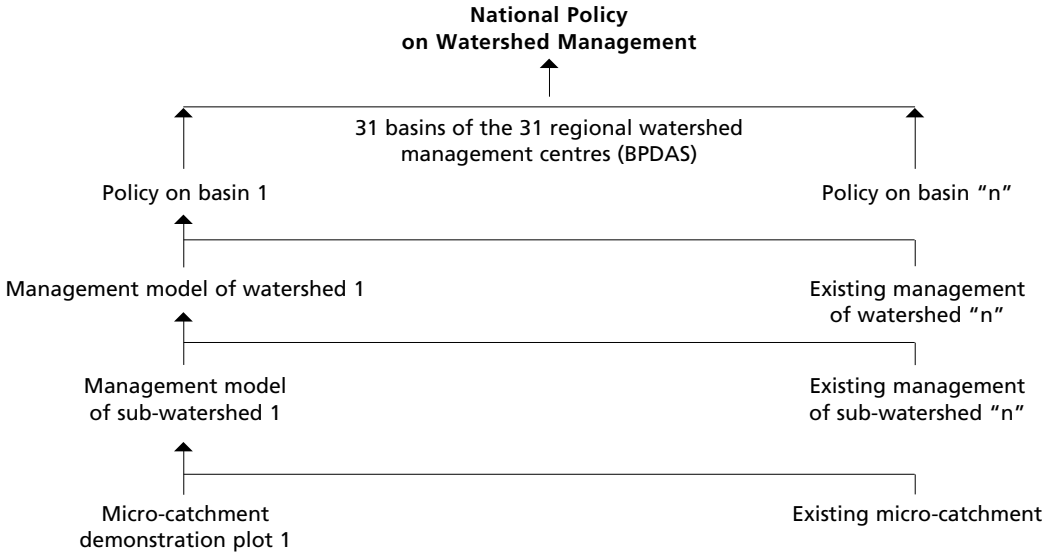
These micro-catchment sites need to be supported by local government and the people. The sites should: 1) not exceed 1 000 ha; 2) have degraded land (critical lands); 3) be accessible; 4) be located in one district; 5) be part of a priority I watershed; 6) have agricultural land, forest land and settlements; 7) not have large areas of karst geology; and 8) include issues of public importance related to watershed management, such as flooding problems and infrastructure protection.

POLICY-MAKING

Water resource management in Indonesia is mainly the concern of the Ministry of Settlement and Regional Infrastructure (previously the Ministry of Public Works). However, water resource management is related to many sectors, including forestry, agriculture and regional development. The government established a Coordination Team of Water Resources Management in 2001. It is headed by the coordination Minister for Economics, with day-to-day activities controlled by the Minister for Settlement and Regional Infrastructure. Team members come from 14 government and non-governmental institutions, including the ministries of Forestry, Agriculture, Home Affairs, and Environment, and the National Development Planning Board.

The coordination team's main task is to formulate policies related to water resource management and to recommend the drafting of legal regulations and policies. It is also responsible for reviewing and evaluating policies, programmes and all activities related to water resource management. The team has established a secretariat with a steering committee, an executive team and separate working teams for water resources regulations, watershed regulation, water quality control and irrigation management.

FIGURE 3
Ideal, bottom-up formulation of national watershed policy



The MoF is represented on the steering committee by the Director-General of Land Rehabilitation and Social Forestry, on the executive team by the Director of Watershed Management and Land Rehabilitation, and on working teams 1 and 2 by officials from the Watershed Management and Land Rehabilitation Directorate. The coordination team is revising the Water Resources Law, 1974 and preparing about 40 water resources management-related regulations, policies and guidelines. These concern the watershed management funding systems, water quality control, flood and drought control, irrigation management and funding, and stakeholder participation in water resource management. The aim is to promote cost-sharing between the government and stakeholders, and local people's participation in water resources management and watershed conservation. These activities ran from 1999 to 2003 funded by a World Bank loan.

The MoF introduced its guidelines for watershed management implementation in 2001. These promote integrated watershed management and call for setting up regional integrated watershed management fora. Regional watershed management centres have been set up to enable the establishment of such fora in priority watersheds in central Java, east Java, north Sumatra and south Sulawesi.

PROBLEMS AND SOME SOLUTIONS

Many stakeholders see watershed management as concerning only a particular component such as the water regime of downstream lands. In some cases this has led to the failure to produce proper development plans for watersheds. For example, in the past, extensive degradation of upstream land was not taken into account when a downstream dam for hydropower generation or irrigation was being built. However, the life of the dam was shortened owing to high rates of sedimentation resulting from soil erosion in upland areas. To overcome this problem, stakeholders need to know about integrated watershed management that attends to all the major biophysical, social, economic and cultural aspects of a watershed.

Officials responsible for watershed management and local administrators have often failed to cooperate. One of the main reasons for this is that watershed boundaries often do not correspond with administrative boundaries, and as a result, other natural resource management and development initiatives go ahead within administrative boundaries. This often generates conflicts and complex problems, as usually no single institution is responsible for managing a watershed's natural resources.

The new watershed management fora are designed to address this problem. They will be set up in all watersheds to alleviate problems. They will be made up of traditional local leaders and representatives from local administration, NGOs, community-based organizations, universities and other stakeholder organizations. The fora will accommodate stakeholders' interests in watershed development. At least four fora were set up last year by regional watershed management centres in central and east Java, north Sumatra and south Sulawesi.

Most watershed management projects have not been sufficiently monitored to assess their impact on downstream areas. As a result, there is scepticism about the downstream benefits of watershed management. The frequently unrealistic expectations of benefits have also led to

suggestions that watershed management does not work. Therefore, monitoring and evaluation needs to be improved to show what does work.

Although it is true that forest cover often reduces runoff and protects soil from erosion (Anwar, 2001), it is wrong to believe that forests alone can prevent floods and drought. This frequent misconception on the part of decision-makers, planners and managers needs to be replaced by a rationality based on facts (Enters, 2002). Rehabilitating forests and lands will protect reservoirs from siltation, but planting trees all over the place, as is often recommended by politicians, will not prevent floods and drought. Much money is misspent in this way and would be better used for protecting forests from illegal logging and other sources of destruction.

CONCLUSIONS

In general, forestry programmes in Indonesia are directly related to and support water and watershed conservation. They are implemented by determining priority watersheds, developing integrated watershed management plans, developing national and regional forest land-use plans, establishing conservation and protection forests, and reforesting and rehabilitating critical lands.

Watershed management in Indonesia suffers from a number of problems caused by a failure to apply the basic concepts underlying the sound management of watersheds. The failure of many watershed management stakeholders to understand the holistic approach to managing watersheds has caused some programmes to fail.

Part of the problem is that previous initiatives have ignored local priorities. A new paradigm in watershed management is needed that gives attention to local norms and knowledge. Such a strategy will be better accepted by local people and be more environmentally sound. Whatever, the fundamental principle is that watershed management should not be top-down, but should take the integrated bottom-up approach with the active involvement of local people.

Provincial and district development is mostly planned within administrative rather than natural boundaries. This leads to the further degradation of natural resources owing to the lack of institutional coordination of adjacent provinces or districts when designing development plans for cross-border areas. This especially relates to conservation areas and protection forests, and to associated upstream and downstream interactions. One side often wants to protect, while the other wants to exploit border areas, which from a watershed point of view should be managed within one development plan.

In summary, the sustainable management of forest, land and water resources demands:
- watershed management to go ahead using natural boundaries as the unit of intervention;
- improved institutional and community capabilities
- improved institutional coordination at the national and regional levels; and
- cost- and benefit-sharing mechanisms that reward upland poor people for providing environmental services to downstream communities.

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