USAID
FROM THE AMERICAN PEOPLE

ENVIRONMENTAL
ESP
SERVICES PROGRAM

ESP CONSERVATION ASSESSMENT AND ACTION PLAN

9 JUNE 2006

This publication was produced by Development Alternatives, Inc. for the United States Agency for International Development under Contract No. 497-M-00-05-00005-00

Photo credit: Asep Mulyana, ESP Jakarta/West Java

Cover story: An activity conducted in June 3, 2006 by several members of Cikundul-Cilaku Sub Watershed Environment Guardian Forum. They are measuring quality water stream of Cikundul Sub Watershed. The picture is taken in Cisarua River, Nusantara Flower Garden, Kawungluwuk Village, Pacet Sub District, Cianjur District, located at 107° 04' 40,3 E and 06° 43' 21,1 S.

ESP CONSERVATION ASSESSMENT AND ACTION PLAN

Title:	**ESP Conservation Assessment and Action Plan.**
Program, activity, or project number:	**Environmental Services Program, DAI Project Number: 5300201.**
Strategic objective number:	**SO No. 2, Higher Quality Basic Human Services Utilized (BHS).**
Sponsoring USAID office and contract number:	**USAID/Indonesia, Contract number: 497-M-00-05-00005-00.**
Contractor name:	**DAI.**
Date of publication:	**June 9, 2006.**

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Environmental Services Program (ESP), is a program of the United States Agency for International Development in Indonesia. ESP is one of several major programs under the Basic Human Services (BHS) Strategic Objective of USAID. The BHS Office covers in general the areas of nutrition, safe water provision and health. Although ESP impacts all three of these areas in various ways, its main focus is related to clean water and other urban environmental services and how these services relate to overall watershed environment and upstream and downstream stakeholders.

The watershed management and biodiversity conservation component of ESP contributes to stabilizing and improving the supply of raw water to urban and periurban population centers in ESP High Priority Provinces and special imperative areas. This is being achieved through promoting a landscape approach to improve land stewardship that integrates conservation of natural forests with high biodiversity values; restoring and rehabilitating degraded forests and critical lands; and supporting sustainable utilization of agricultural lands. It is also enabling conditions for improved land stewardship, including policy support for land tenure necessary for responsible community based forest management, as well as financing options to reward upper watershed communities for activities that contribute to conserving a stable supply of raw water for their down stream neighbors.

This report documents the approach adopted to assess biological values as a contribution to ranking and prioritizing high priority areas. In doing so, it makes several reasonable ecological and practical management assertions. Namely, that land that is rehabilitated by planting of trees, particularly with mixed species, will advantage biological diversity compared to land that is degraded or has been converted to non – forest agricultural monospecies crops. Further, that watersheds and areas within them that have many protected species, high habitat variety, high forest connectivity, high forest canopy cover, many conservation protected areas, few natural disasters, spatial plans that are empathetic to biological values and are widely respected, good land tenure rights, few environmental management conflicts, good governance structures and many potential collaborative projects, will favor biological diversity compared to their corollaries.

Biological diversity in watersheds needs to be conserved throughout their landscapes. While Protected Areas (PAs) are very important in this regard, other areas outside PAs may be extremely important also, particularly for those ecological course-grained species that obtain their required resources from numerous habitat patches, or which have extensive local movements or migrations. ESP is also cognizant that biological diversity in watersheds is often highest at the interface between forests and agriculture lands and that mixed community gardens or kebun and traditional agro forestry systems have a role to play in maintaining biological values in these often very disturbed landscapes.

This report also details a similar process used to identify, through stakeholder forums, conservation targets and management action plans for conservation targets inside and outside PAs.

Type of PAs are identified by summary statistics for each High Priority Province (HPP), but if PAs are present in the ESP identified priority watersheds, they are also discussed in more

detail and assessed for their conservation values and ESP conservation focused activities. Small PAs in ESP priority watersheds that are degraded and have no identified conservation importance, are only considered for ESP activities if they have clear forested links to other high conservation value areas.

PAs outside ESP priority watersheds are considered for ESP activities only if they are connected by forested links to those in priority watersheds, but they are of lower priority.

ESP involvement within PAs is scoped, with brief descriptions of possible and current ESP activities, based on their biodiversity importance and value to watersheds and soil conservation. Clearly, large PAs are important if they have an extensive assemblage of animals high in the food chain (e.g., mammalian and avian predators) and have extensive intact forest. Particularly, if they are also located in important catchment areas on land that has a high potential for erosion (steep slopes, high rainfall and fragile soils) and which is connected by forest (primary or complex mixed secondary) to other high biological conservation value areas, or to areas that are the focus of ESP rehabilitation activities.

ESP has selected sites for focused conservation planning and actions (HPP, Watersheds, Sub Watersheds, clusters of villages in Sub Watersheds) using the integrated spatial planning approach of DAI, namely identifying the "development pathway". This approach is an objective-oriented flexible framework to plan conservation interventions and select the spatial maps of greatest potential for a specific conservation objective.

This is proving to be of immense value to ESP's overarching strategy in all priority watershed areas because it:

- Fosters community participation and adoption of local knowledge in the planning process.
- Promotes a cross-cutting approach that links government institutions.
- Transfers innovative spatial methods and capacity building.
- Creates transparency for open dialogue and debate for community involvement in conservation action plans.
- Captures best practices and communicating information across administrative boundaries.

ESP uses a centralized information system (TAMIS) for project administration, logistics management and monitoring of outcomes. TAMIS has been linked to spatial data to develop a GIS view that integrates relevant information on spatial information which is made available to ESP watershed conservation management teams through a user-friendly internet-based application. This facility is supporting a consistent ESP data management approach (and types of data collected) and allows for ease of access to both information and analysis of spatial relationships.

This identification of priority watersheds and sub watersheds is based on a set of criteria selected to identify high biological values include endangered, vulnerable, and endemic species, but mainly they are focused on proxies for biological diversity, such as distribution and abundance of habitat types, forest canopy cover, and identified important assemblages of animals, such as Birdlife International's Important Bird Areas.

ESP identification of specific and tactical conservation management actions in watersheds, both inside and outside PAs, are identified by the same process. This process, which follows USAID 2005 guidelines, depends on rapid identification through stakeholder groups, of the

important conservation objectives or targets (which among others, should include biological, water and soil). This is followed by a threat and situation analysis on each of the conservation objectives to identify practical solutions to abate threats. Solutions that can be carried out by villagers using their existing resources (such as revegetation of river banks through replanting of trees) are given high priority for action.

ESP facilitation of these actionable management plans is that of a mentor working through community forums. ESP ensures that these 'actionable plans' follow an adaptive management scenario. Initially, ESP assists in writing these action plans, ensuring that they have clear deliverables, milestones and indicators of success, assists in their monitoring and evaluation and assists obtain finance for their implementation.

The nature of these actionable plans provides sharp focus for ESP biodiversity conservation activities on the ground.

ESP facilitated rehabilitation of watersheds through tree planting has the greatest value to biodiversity if it is spread through the priority watersheds, and not concentrated in 'blocks' and is state owned land (tanah negara) that cannot easily be sold and converted in the future. For example, revegetation of river buffers zones, which are 50m to 100m on either side of first order rivers by law, will form a network that will assist conserve water values (by reduction of sedimentation rates resulting from bank erosion), provide corridors for the movement of more mobile species throughout the watersheds and provide widespread habitat for many species. The exception to 'block planting' would be on peaks or ridgelines. This approach would also have an immediate and landscape scale 'greening' impact in some watersheds, such as the Progo watershed, Central Java.

A participative scenario for forming management forums at both the level of villages and watersheds is outlined. Common solutions to abate threats of concern to these village level forums are mainly aimed at mitigating proximate threats to conservation objectives; they are drawn out and given priority for an entire watershed. A management plan for each watershed is developed from a group of stakeholders formed from senior management and policy experts. This Forum is formed mainly from stakeholders from the province with specialist knowledge of the specific watershed. This 'Overall Watershed plan' focuses more on solutions to abate ultimate threats to watersheds, such as government policy, legal frameworks etc. ESP has a purposeful role in the effective operation of the executive forums, by assisting with the development of their mission, operational processes, including development of a secretariat and structures (to include technical advisory, monitoring & evaluations, fund raising, policy and spatial planning groups), collaboration with other agencies and organizations and with their community status and standing. There must be clear linkages between village level forums and executive forums.

In the case of large areas of conservation importance, both inside and outside PAs, recommendations for ESP activities in important conservation areas that have had little conservation management input to this date will include the following:

- Facilitate a rapid natural resource inventory to enable identification of important conservation objectives. This may be both desk top and field based.

- Facilitate the development of a conservation management action plan through stakeholder involvement that incorporates conservation

management zones (for areas other than Strict Nature Reserves or *Cagar Alam*) and specific management solutions to abate threats to conservation targets.

- Facilitate both collaborative management structures and management practices.
- Assist identify sources and obtain funding for conservation action plans.
- Mentor the implementation of action plans.

ESP involvement in the three large Grand National Parks or Taman Hutan Raya (e.g., Tahura Bukit Barisan, North Sumatra Tahura Dr Mohammad Hatta, West Sumatra and Tahura Raden. Suryo, East Java) are particularly important. This is because they are under the control of the Provincial Forests Department or Dinas Kehutanan which has limited knowledge, capacity and funds to implement conservation management. None have a formed management unit, management plans or collaborative management scenarios in place. All have important biological values, are important water catchment areas and are exposed to a number of current and future threats.

The National Park, Taman Nasional Gunung Gede Pangrango (TNGP), has been selected by the Indonesian Government as one of several model national parks that will be used to inform management strategies more widely throughout Indonesia. This offers an excellent opportunity for ESP to leverage its watershed conservation management posture widely through Indonesia, because many national parks are sited on critically important watersheds. To this end, ESP is working closely with TNGP, at the invitation of its management unit (UPT) Director, to assess their existing management plan and management activities. ESP is currently working with the TNGP staff and other key stakeholders to reforest an area in their rehabilitation zone or zona rehabilitasi. Additionally, ESP has formed a stakeholder forum that allows TNGP staff to collaborate more easily with other stakeholders on issues such as encroachment and water management, and become intimately involved in the preparation of watershed management action plans developed by this forum.

ESP is also actively involved in the policy discourses related to: payment of environmental services, whereby water users make compensation payments to protect water values in upper catchment areas; strengthening existing policy on collaborative management within and outside protected areas; and improvement in spatial planning scenarios - all of which may result in important gains for biological conservation in high priority watersheds and more broadly throughout Indonesia.

1. INTRODUCTION

The Environmental Services Program (ESP) is a program of the United States Agency for International Development in Indonesia. ESP is one of several major programs under the Basic Human Services (BHS) Strategic Objective of USAID. The BHS Office covers in general the areas of food, safe water provision and health. Although ESP impacts all three of these areas in various ways, its main focus is related to clean water and other urban environmental services and how these services relate to overall watershed environment and upstream and downstream stakeholders.

Between 2005- 2010, ESP is devoting resources to the achievement of a Special Objective (SpO) that bridges the critical connection between healthy ecosystems and basic human services. USAID will focus its interventions on key threats to biodiversity values, and specifically target protection of critical ecological processes and functions. To the extent possible, water resource related threats will be emphasized in order to maximize synergies with other elements of the Higher Quality Basic Human Services Utilized SpO. From a management perspective, the activities of this SpO will be seamlessly integrated into ESP activities and will report using the same intermediate results and many of the same indicators.

The watershed management and biodiversity conservation component of ESP contributes to stabilizing and improving the supply of raw water to urban and periurban population centers in ESP High Priority Provinces and special imperative areas. This is being achieved through promoting a landscape approach to improve land stewardship that integrates conservation of natural forests with high biodiversity values; restoring and rehabilitating degraded forests and critical lands; and supporting sustainable utilization of agricultural lands. It is also enabling conditions for improved land stewardship, including policy support for land tenure necessary for responsible community based forest management, as well as financing options to reward upper watershed communities for activities that contribute to conserving a stable supply of raw water for their down stream neighbors.

The importance of watersheds to the conservation of natural resource values, and specifically biological diversity, in Indonesia is recognized by the USAID, Jakarta Report on the biodiversity and tropical forests in Indonesia: submitted in accordance with foreign Assistance Act sections 118/119. This report recognizes the key elements of biological diversity in Indonesia and identifies strategies to conserve this biological diversity (Rhee et al. 2004). Throughout this document there is an emphasis on an ecosystems approach as the most effective way to maintain and maximize biodiversity.

As summarized in a report by the World Bank (2001), ecosystem level planning and management "embraces a continuum of different land uses from strict protected areas to production landscapes. It also means retaining permanent representatives of the forests and other distinctive vegetation and habitat types; creating new PAs to maintain remaining fragments of natural forest and protecting forest corridors that link remaining forest blocks; managing production forests for sustained forest production and as buffer zones around, and corridors between, PAs. It could also include the establishment of new inventive approaches, such as conservation easements, conservation concessions, conservation sensitive spatial planning and conservation farming, to assure better management of the entire conservation estate. This latter packet of conservation measures is deemed particularly important because

the biological richness of Indonesia and in most other countries also, cannot be maintained in PAs alone.

The rapid rate of forest degradation in Indonesia is a key issue for management, both inside and outside of protected areas, because it negatively affects both biodiversity and environmental services. There are many proximate causes of deforestation. However, the underlying causes are governance issues. The threats to forests, biodiversity, and watersheds are complex and inter-related – all three are negatively impacted by the lack of clear tenure or access rights, illegal logging, conflict, and corruption. In general, demands on natural resources and environmental systems in Indonesia are intensifying. Rates of loss of forest resources in Indonesia are among the highest in the world. This seemingly inexorable fragmentation and loss of terrestrial and aquatic habitats is accelerating the loss of biodiversity. Such degradation puts at risk resource-dependent economies and local livelihoods and increases poverty and conflicts. It impacts urban centers by reducing the quality and quantity of water available to them (Rhee et al. 2004).

Land tenure is a key issue, principally a governance issue. The term "tenure" encompasses the issues of access, security, control, rights and responsibilities to use and manage forests specifically, but also land and natural resources more generally. Tenure also touches on fundamental concerns about equity and justice, which complicate the political and policy environment in which solution approaches can be developed and implemented. Uncertainty of tenure creates economic incentives for short-term management practices, rather than long-term investments. Increased certainty would lengthen planning horizons and increase investment in the resource, (e.g., tree planting, agro-forestry and less destructive harvesting techniques). These kinds of investments can improve environmental service delivery and may increase biodiversity.

With the rapid rate of forest loss in Indonesia, more attention is needed on future scenarios where there will be much less forest area and much more converted and degraded land. Policy decisions and precedents established in the next few years will largely determine the status of this degraded land, the activities allowed on it, and the people who have access to it.

Administrative boundaries of local governments are not designed to address ecosystem level impacts and watershed management needs. These cross-boundary issues have been exacerbated by the decentralization process, which has created dozens of new local governments, but no new regional level institutions for environmental management. Partly as a consequence of lack of integrated management, inland waters and wetlands are increasingly affected by flooding, sedimentation, urbanization, industrialization, and accompanying pollution. More generalized environmental degradation in forested uplands affects both water quality and water quantity in more heavily populated downstream regions. Both agricultural runoff and industrial discharges contribute to a worsening of water quality. Land conversion of forests to agriculture or settlements and land filling for development projects and settlements affect both watersheds and wetlands, with increasing evidence of imbalanced hydrologic regimes reflected in seasonal drought and flooding.

In Indonesia, conflicts traditionally have been over natural resources. These conflicts have been exacerbated by overexploitation of resources, ambiguous transition to decentralization, poor relations between ethnic groups, marginalization of rural communities and attendant resentment, and lack of law enforcement and prosecution of illegal activities. Conflict stems from *poor governance*, perceptions of historical *injustice*, inequitable and

inconsistent *law enforcement*, breakdown and shifting of prior *power relationships*, lack of broadly accepted *multiple land-use spatial plans* to resolve resource use conflicts, as well as *abuse of power* particularly by the concentration of the resource industry in the hands of few politically strong people.

Currently Indonesia's forest sector remains in a state of crisis, mainly because the above reasons for conflict still exist. Illegal logging continues on a vast industrial scale accounting for about half the timber extracted from forests. This logging is controlled by perhaps a few dozen companies. Thus, relatively few people benefit from this continuous environmental degradation, which is extremely severe by world standards. In addition to the above general comments, this crisis continues because of the: concentration of the wood processing industry in the hands of a few powerful people; subsidized rapid clearing of forest land for conversion to plantation crops; centralized forest administration that does not translate to effective management and enforcement in the provinces; and marginalization and alienation of forest dependent communities from their traditional lands.

Despite the above mentioned scenarios, many believe that the enabling environment makes current times more opportune to achieve both reform in the forest sector and improved land conservation practices. This is because of the emergence of civil society as a force in the political process, as reflected by a more open and informed media, particularly in making links between deforestation and environmental consequences, such as flooding, fire and landslides - and a much increased visibility of the NGO community in voicing opposition to environmental destruction. Also, since 2004, the central and some provincial governments are increasingly committed to fighting corruption and illegal logging in response to civil society calls for greater transparency in decision making.

Watersheds fit IUCN protected area categories V and VI. These areas can take the form of conservation concessions for protecting high value critical habitats that lie outside the existing PA system. However, to bolster these local management and conservation initiatives there is a need to develop a supportive policy framework at the national level.
Upstream and downstream issues, needs, benefits, and losses can be quite different, raising different concerns for stakeholder groups and creating different opportunities for appropriate interventions. One area that combines opportunities in governance, management, and communities, is the idea of compensation across boundaries for the production of environmental services or the mitigation of environmental losses. Although there have been some local experiments, the continuing power struggle over authority and responsibility among levels of government has impeded the widespread adoption of these kinds of integrative approaches. Rhee et al. (2004) recommend:

- Strengthening networks of communities and stakeholders focused on broader watershed management issues.
- Development and testing with local governments, innovative financing mechanisms, such as payments for environmental services (PES), which address the fact that upstream utilization practices often have a profound downstream effect on community quality of life.
- Combining watershed habitat protection activities with community development and livelihoods enhancement (agro-forestry, community-based planning, and water management, community-level forest management activities) to address tenure uncertainty.

Indonesia's environmental and natural resource management approaches are mainly sectoral in nature and not particularly effective in their implementation. There is significant

opportunity to design stronger, better integrated environmental management systems at the national and regional levels. The World Bank (2001) recommends that biological conservation in Indonesia needs to be mainstreamed into traditional development. This means the incorporation of biodiversity issues, options and objectives into sectoral policies, sustainable national and regional development programs, and project impact assessment and mitigation/management plans in order to promote conservation management within the production landscape. In effect, projects in traditional sectors such as water, urban, agriculture, infrastructure, industry, energy, rural development and tourism need to balance environmental priorities in order to ensure sustainable development (World Bank 2001).

2. ASSESSMENT OF HIGH BIODIVERSITY VALUE AREAS IN ESP HIGH PRIORITY WATERSHEDS - OTHER THAN PROTECTED AREAS

2.1. INTRODUCTION

Conservation planners and managers are always faced with decisions that relate to scale when exploring strategies for broad regions. It is never possible to implement conservation activities everywhere. So it is necessary to choose the places to focus activities where overall conservation success is likely to be greatest. Unfortunately, this quest leads to a fundamental paradox in conservation management. Namely, that the probability of having significant success in the short- term is greater in smaller areas, whereas the probability of successful long-term management is greater in large areas (Foreman 1995). This reality of scale has mandated paradigm shifts in conservation throughout the world, which is away from a sharp focus of management in protected areas to a focus on the broad landscapes in which protected areas are embedded (see Box 1).

Knowledge of biological attributes, along with water and soil attributes are important information to assist identify areas of high conservation values in expansive areas, such as watersheds or sub sets of watersheds.

ESP mapping of high conservation value areas in the HPP relies by necessity on a focus on a selected few biological attributes which are taken to reflect broader biological diversity patterns within HPP. The most accurate attributes to reflect biological diversity are taxonomic species or communities, for example, the distribution of orchids or of a particular guild of endemic birds. However, in Indonesia, knowledge is sparse or absent concerning spatial patterns of biological diversity and

Box 1. The importance of landscape focused conservation

The approach that USAID applies to conservation of biological diversity has evolved from that of the 1980s, when their programs focused on protected area management. They now support programs that emphasize biodiversity conservation across large landscapes.

USAID current approach recognizes that biological diversity cannot be conserved only in isolated areas and that much of the world's biological diversity is not located in protected areas. This approach underscores that participation by local stakeholders in conservation programs is critical to their success (USAID/ARD 2005).

distribution of specific species and species assemblages. In those few instances where there is such information (such as protected species) or assemblages (e.g., Birdlife International's Important Bird Areas and vegetation structural types) such information was mapped and used. However, other known proxies for biological diversity, such as soil maps, habitat types, presence of conservation protected areas, measures of threats to biological diversity etc. were also used.

Expensive and time consuming biodiversity surveys were not an ESP option to assess and select high conservation value areas in HPPs and then between and within watersheds. Rather, the increasingly used spatial solutions approaches (see Forman and Collinge 1996, TNC 2000 and Vreugdenhill et al. 2003) was preferred. This approach, which is built on known relationships between the ecology of landscapes and biological diversity, water and soil values, uses a combination of mapped biotic and abiotic attributes. Abiotic factors selected, such as soils, habitat types, river density, are known to have a strong association with biological diversity and are commonly accepted proxies for assessment of biological diversity.

The DAI integrated spatial planning approach, termed "*development pathway*", is eminently suited to select the spatial maps of greatest potential to assist identify appropriate spatial solutions and to plan conservation interventions.

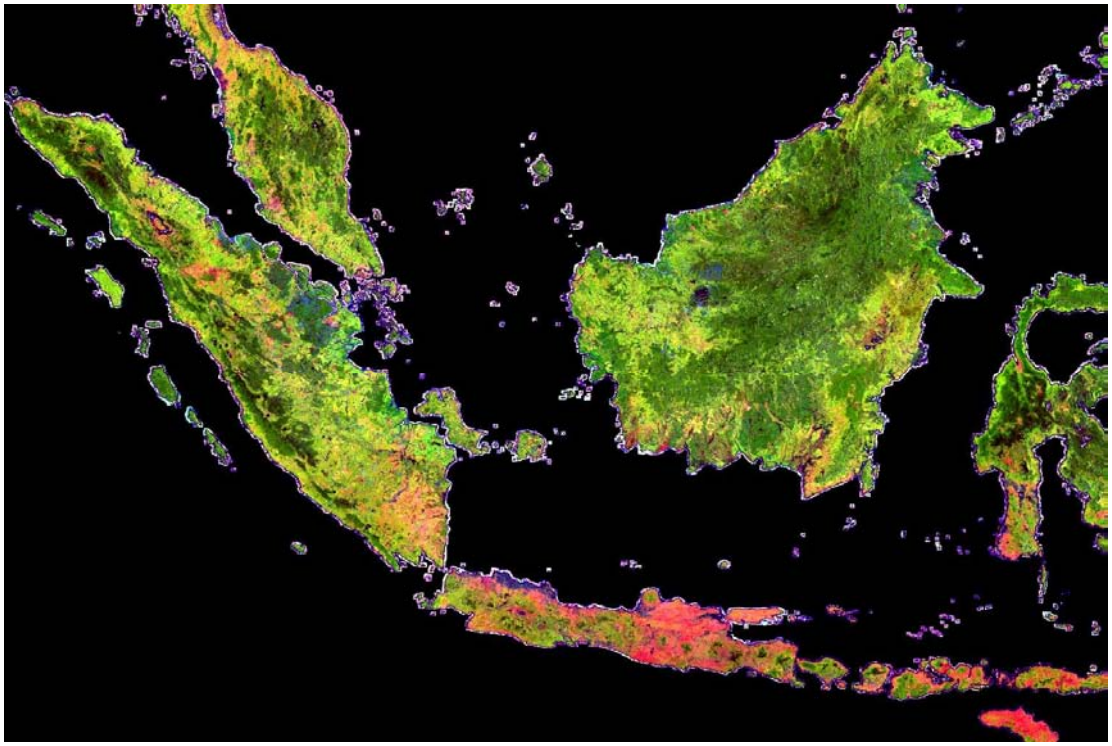

Figure 1. Landsat image of Java and Sumatra. The extent of red relates to disturbed areas. Indicating that much more of Java is disturbed compared to Sumatra.

Although the two islands of Java and Sumatra have biological commonalities because they were connected some 18,000 years ago by the glacial induced fall of the seas by some 130m which currently connect them. Both islands, along with Borneo, were also interconnected with mainland Asia via the Malaysian Peninsula to form Sundaland. Consequently, many species were able to move around and colonize both Java and Sumatra. However, the geological histories of both these islands and their geography vary

considerably. Among other factors, Java has more volcanism, especially in recent times. Mountain ranges that traverse the length of both islands also formed strong ecological barriers that have allowed autochthonous (regional) speciation and the emergence of island specific endemics. Sumatra also has a much larger area of watershed than Java (40,861,940 ha versus 10,873, 538 ha) and twice as many major river basins (30 versus 15). Layered on top of these factors that have produced the modern patterns of biological diversity in Java and Sumatra are impacts of man. Java and Sumatra have experienced very different modern development histories and impacts from man. Java began to lose much of its forested areas before the strong conceptual development of conservation protected areas in the country. Consequently, few forest areas remain in Java to connect existing protected areas as corridors. On the other hand, Sumatra retains more possibility in this regard, although options for linking land in Sumatra are vanishing rapidly as the forests are still being cut down at an alarming rate. PAs are also smaller on average in Java than in Sumatra. Figure 1 illustrates the different levels of disturbance of forested areas in Java and Sumatra.

Criteria to assess high conservation value areas in Java and Sumatra varied to reflect differences in their land disturbance, potential for connectivity between forested areas, level and nature of threats to biological diversity- and community attitudes to conservation.

2.2. PRINCIPLES

An initial decision made by ESP was to select watersheds and sub watersheds that were in i) the best biological condition; ii) where society could demonstrate a relatively planned and wise usage of water and other natural resources and reduced conflicts; and iii) where watershed degradation and pollution was the least impaired. Such a selection would ensure the greatest chances for ESP implementation success.

Further, it was deemed necessary to identify high conservation values at a scale that would enable conservation action management plans to be developed and implemented practically by small manageable stakeholder groups, frequently involving a small functional grouping of villages that had some commonality, either socially, culturally or economically.

It is unusual to consider that disturbed gardens and mixed plantations should be regarded as centers of biodiversity. But in a dramatically changed landscape, such as occurs over much of the lowland and some mountainous parts Java, these places retain important relictual populations of a lowland biota that has all but disappeared from many areas. Further, vertebrate surveys on Java show that species richness is often higher at the disturbed edges of 'natural' forests than inside the forest. Caves contain unique assemblages of vertebrates and are crucial habitats for a number of insectivorous and fruit eating bats, swiftlets, endemic whip scorpion and crickets.

All extensive remaining patches of natural vegetation on Java, even if secondary, are of the highest conservation significance. Initiatives to conserve the remnant biodiversity of Java (and to a lesser extent Sumatra) require exploration of new approaches to management, particularly outside protected areas. Strategies need to be explored to maintain and increase the variety of plants and animal in village gardens and plantations and to educate villagers of their vital role in conserving what remains of their biological heritage (Rhee et al. 2004).

The conservation of more remnant lowland rainforests and mangroves in existing protected areas is considered a priority by Rhee et al. (2004). For example, Gunung Halimun, West Java, has more lowland rainforests surrounding it than it has inside its boundaries. And Nusa Kambangan, on the south coast of central Java, urgently needs protection to prevent recent illegal logging activities that threaten to degrade this relatively undisturbed relict of lowland forests.

Before establishing criteria to select the best watershed areas for ESP to work in HPP, it is necessary to identify the scale of such potential areas. The scale can be determined by a number of parameters. For example, land use type boundaries; administrative boundaries, such as villages (*desa*), groups of villages/sub districts (*kecamatan*) or districts/regencies (*kabupaten*); or natural subsets of watershed areas formed by the various lesser orders of rivers and streams (second, third and fourth order), such as sub watersheds (Sub-DAS or Sub-Sub-DAS). It is recommended that various levels of sub watersheds are used to create a stratigraphy or substructure within the major high priority watersheds and that these sub watershed areas be ranked for focused ESP attention using similar criteria to those that were used to select the high priority watersheds.

The advantage of using subsets of watersheds is that they are fractal units of the high priority watersheds. They have an area that is higher above sea level in the watershed (*hulu*) and one that is lower (*hilir*). They contain river networks and ecological functions that reflect those of the larger watershed areas. They contain a limited number of villages with whom ESP can practically work with to develop tactical management action plans. Consequently, there is high potential that outputs and lessons learnt from these smaller 'fractals' will have relevance to the high priority watersheds and can be applied throughout these watersheds.

2.3. PROCESS

2.3.1. ESP MANDATED CRITERIA

The ESP Scope of Work clearly mandates certain criteria should be considered as drivers for both selection of ESP High Priority Watersheds, and then the areas within these watersheds that should be the focus for ESP conservation interventions. These are:

i. *Areas that have existing Basic Health Services (BHS) Programs and/or USAID Strategic Objectives.* Because, ESP is committed to work closely with and in parallel to other relevant BHS programs (e.g., BHS Health Flagship program; Development assistance program & Safe Water Systems Project), plus USAID Strategic
Objectives (Local Government Support Programs and BHS High Priority Provinces & Special Concerns and Imperative Areas. Information is readily available on these associated activities.

ii. *Areas of high human populations, including high levels of poverty*. Data and maps are available on population densities and levels of poverty based on political administrative areas. These can be assessed readily for watersheds by overlaying maps of watersheds on administrative boundaries.

iii. *Areas that have a high incidence of water borne diseases such as diarrhea and skin diseases.* Maps of the incidence of these diseases are available for

administrative areas. They can be related to watershed boundaries, again by simple map overlay.

iv. *Include only river basins that flow from 'ridges' to 'reefs'*. This is simply obtained by including only those watersheds that are distributed from the inland mountains to the coast.

v. *Areas of high biological conservation value in upper catchment areas*. It is not always clear whether a higher priority should be given to biological diversity in those watersheds that are under the greatest- or the least threat. There is no simple solution to this conundrum, but the tradeoffs among urgency, cost and probability of success need to be considered. USAID has supported both kinds of conservation activity (USAID/ARD 2005).

Some guidelines for selecting high biological conservation value (HCV) areas are available in the Indonesian Protocol for the identification of High Conservation Value Forest areas (Box 2). Originally, this protocol emphasized the identification of actual species. However, in practice the approach has increasingly focused on identifying proxies for biological diversity, such as habitat types, and to focus more on faunal and floral assemblages than single species. This is because little information is available throughout Indonesia on the distribution of animals and plants at the scale of a forest concession (or an upper catchment area in a watershed). The HCVF protocol emphasizes the value of identifying the presence of significant concentration of biodiversity values, namely presence of critically endangered species and any temporal concentrations of critically endangered, endangered and vulnerable IUCN listed species; conservation protected areas; rare or endangered ecosystems; forests critical for providing community water sources and to protect catchment areas from erosion; and protecting local community cultural values and health. The Protocol also identifies as very important the contribution of the target area to landscape scale ecological functions.

Box 2. Indonesian Tool Kit for identification of High Conservation Value Forests

"The diversity and highly variable conservation context and land use patterns of different regions makes the development of nationally relevant definitions and lists of HCVs very difficult. …… users are encouraged to consider the island and ecoregion context of the forest area."

It requires "users to identify HCVs that cover a wide range of ecological, environmental, and social issues and requires an understanding of regional biodiversity issues, animal and plant ranges and behaviour, water and soil resources, ecosystem health, anthropology, and local economy. …… The toolkit process is highly reliant upon the input of local and national expert organizations and individuals……In a number of cases, these organizations should provide the key inputs …… on the status of forest types and rare, threatened, and endangered species and help devise management strategies to ensure the maintenance or enhancement of these values" (Anon 2003).

Rapid identification of high conservation value areas at the landscape scale and finer scales has moved rapidly over the last decade to utilizing GIS interpretation of spatial maps (Forman & Collinge 1996; The Nature Conservancy 2000; Brooks et al. 2004). And has moved away from the time consuming and labor intensive taxonomic surveys of selected, perhaps unrepresentative, groups of animals and plants (Vreugdenhil et al. 2003). Although conservation planning is in part a spatial exercise, techniques for mapping ecological processes, such as watershed functions are in their infancy (Cowling et al. 1999). For this reason, conservation planning has mainly focused on biodiversity features that can be mapped (Brooks et al. 2004).

There were a range of spatial maps that reflect, or are proxies for, biodiversity variety that may be used as indicators to identify the conservation value of watersheds. For example, conservation protected areas, areas of important plant or animal diversity, soil and vegetation types, biological zones, digital elevation models (DEM), slope and aspect, climatic zones, river and stream density and complexity, etc. (see also Forman & Collinge 1996).

However, cognizance is taken of the statement of Brooks et al. (2004) that "spatial data on species are essential in conservation planning and cannot be disregarded or replaced by broad scale surrogates" (proxies)." While that is emphatically true at very fine scales, at the scale of watersheds it is less true. However, for watersheds, we included relevant species data if it was available; such as rare, vulnerable and endangered species and Important Bird Areas. Specific information on species distribution is further accounted for during the preparation of conservation management action plans as described later.

Further, a brief study will be initiated to confirm that areas selected as HCV using spatial solutions do in fact hold more biodiversity than those not so selected. This study will be carried out in at least one high priority watershed. It will compare species richness and species diversity of birds and dung beetles, during both the wet-season and dry-season, both in areas selected as HCV and in those not so selected.

The ESP April 2005 First Annual Work Plan, calls for a matrix of criteria to assist in the selection of ESP Immediate Watershed Target Areas - one

municipality and two districts - through meetings and literature review. ESP documents indicate criteria for consideration, and how they should be organized are: i) Table 1 of ESP Activities- *priority Site Selection Indicators matrix for GIS and spatial planning Classification,* 2nd draft; ii) the *Environmental Services Site Selection Intake Form Concept*; and iii) The Watershed *Management Planning in ESP: focus on the inter-phase of stakeholders and ESP project staff July 2005 section 6*. Additionally, other considerations are criteria already established by the other ESP regional teams and recommendations of the Central Java working group.

Most of the criteria referred to above have been included in these recommendations with the exception of community livelihoods criteria,

which are more relevant at the later phase of management interventions, than as criteria to select priority watersheds. The presence or absence of community livelihoods is thought to indicate opportunity rather than receptivity to support existing, or established alternative livelihoods. Some others have been merged because they repeat information present in other criterion.

2.3.2. OTHER WATERSHED SELECTION INDICATORS

Society, Productive Activities & Use of Water Indicators

Several strategic documents were available as sources for information to assist select priority watersheds. These are:

- BAPEDALDA's '2005 Grand Design' priority watershed reports.
- BAPPEDA's European Union produced *Good governance in water resource management (GGWRM) IDN/Relex/200-2004*. These documents, which appear to have been produced in parallel with the 'Grand Design' documents, but without a great deal of collaboration. They also contain data to construct at a watershed scale, quantitative indicators of important social parameters, such as poverty, health, illegal activities and impacts of development on watersheds, (e.g., GGWRM: 2005, Buku III. *Penjunjang penyusunan rencana induk pengelolaan SDA Wilayah Sungai Progo-Opak Oyo*). As with the "Grand Design' documents, they also include a number of detailed spatial maps that would be of value to ESP planners.
- GOI Satwa Wilayah Pengelolaan (SWP) DAS plans. These plans identify critical DAS/Sub DAS based on erosion potential of soil, critical infrastructure and population pressure. For example the plan *DAS/ Sub DAS Prioritas serta lokasi dan luas lahan kritis sebagai sasaran penghijaun dan reboisasi dalam repilita IV. Sekretariat Pengendali Bantuan Penghijauan dan Reboisasi Pusat Jakarta, Augustus 1985 (Penerbitan #25-8/Pet/ Sek/TPP/1985* contain a great deal of information that might inform the ESP selection process.

Watershed Management & Allocation for Watersheds Indicators

Most selection criteria used to rank this aspect of the watersheds are directly connected to the status of watershed management. Particularly, information on water debit, flooding, waste treatment and contamination/pollution of the surface and underground waters. One aspect that has not been developed, though, is the extent and rate to which the underground aquifer is recharged, in both the upper catchment areas and at different sites in the lower watershed. Recharge may be greatly assisted by re-vegetation with trees that hold water in their roots and buttresses and allow it to percolate to the underground aquifer. Other means of recharge are irrigation to paddy fields, and through certain types and distributions of dams in the watersheds. There exists a great deal of data to assist development of quantitative ranking criteria. This was used to evaluate this group of indicators. However, it was also obtained from interviews using only qualitative categories for ranking purposes.

2.3.3. CLARIFICATION AND JUSTIFICATION OF BIODIVERSITY SELECTION INDICATORS

The HCVF protocol emphasizes the value of identifying the presence of significant concentration of biodiversity values, namely presence of critically endangered species and

any temporal concentrations of critically endangered, endangered and vulnerable IUCN listed species; conservation protected areas; rare or endangered ecosystems; forests critical for providing community water sources and to protect catchment areas from erosion; and protect local community cultural values and health. The Protocol also identifies as very important the contribution of target area to landscape scale ecological functions.

Criteria used to evaluate i) *Biological and natural resource values* are usually indirect, and recognize proxies for these values. As such, they require more explanation and justification than the criteria established for the other watershed situations listed under the headings. ii). *Society, production activities & use of water* and iii). *Watershed management & allocation for watersheds*. For this reason, this section 2 clarifies and justifies only biological and natural resource criteria.

Criteria listed below may not be of value to identify all high priority watersheds (DAS) within each High Priority Province. Nor may they all be suitable to select Sub watersheds (Sub DAS) or Sub Sub Watersheds (Sub- Sub DAS). For example, there is no Man and Biosphere or Ramsar Sites in Central Java. There are two World Heritage Sites but they are of little consequence to the Central Java Priority Watershed selection process because they are the restricted Borobudur and Prambanan temple sites. Also the Hotspot fauna and flora map produced by Conservation International was examined but all Sundaland is included so that the hotspot areas (see www.biodiversityhotspots.org) are too extensive to assist the Java and Sumatra selection process. Further, major biotic zones, biogeographic regions, disturbance zones and climatic zones have a scale that is generally too broad to be of value for identifying Sub watersheds or finer scales.

WWF Global 200 world ecoregions www.worldwildlife.org/science/ecoregions/g200.cfm). Normally these regions would be a separate selection criteria used to assist identify HCV areas. The occurrence of several of these ecoregions in a single watershed, could be expected to be a biologically relatively rich area because of the opportunity for different biotic assemblages to mingle. However, in Central Java, the boundaries between the WWF global 200 Ecoregions (Western/ Eastern and Mountain/Lowland Forests) have been incorporated into the ESP vegetation map- and so were not ranked again.

Forest Dept reserves
Forest department reserves, such as *Hutan Lindung*, are identified as areas likely to contain high conservation values.

PHKA Protected areas
There are six PHKA classification types of conservation protected areas in Indonesia. Namely, *Cagar Alam* (Nature Reserves); *Suaka Margsatwa* (Wildlife Reserves); *Taman Nasional* (National Parks); *Taman Wisata Alam* (Nature Recreation Park); *Taman Hutan Raya* (Great Forest Park) and *Taman Buru* (Game reserve). All these PAs are considered in this ranking process. Their locations were obtained from the PHKA web site (Http://www.dephut.go.id).

IUCN critically endangered (CR), endangered (EN) and vulnerable plants and animals
There are two official statements of the endangered and vulnerable species in Indonesia. One by the IUCN (see www.iucnredlist.org), current to 2004 and the other by the Indonesian Government listings by LIPI staff in Noerdjito and Maryanto (2001). This protocol uses both lists. Javan and Sumatran species on this list were extracted and their distributions mapped. Areas that have any Critically Endangered species present or have a

concentration of Endangered, Vulnerable and Endemic species are considered to have high conservation value.

WWF 200 Priority ecoregions (see, www.worldwildlife.org/science/ecoregions/g200.cfm) *Ramsar sites* (see www.ramsar.org/index_list.htm), *World Heritage Sites* (see whc.unesco.org/nwhc/pages/sites/s_worldx.htm), and *Man & Biosphere sites* (whc.unesco.or/mab/wnbr.htm)

Important bird areas (IBAs)
Rombang and Rudyanto (1999) identified the important bird areas (IBAs) for Java and Sumatra. These maps were merged with the Java and Sumatra watershed maps, and number IBAs in a given watershed counted and ranked.

Biogeographical sub regions, zones, units or areas
Discussions with national biologists indicate that there are no recent published biogeographical zones or units proposed for Central Java; none existed previously. However, both biotic zones and vegetation boundaries have been drawn for Sumatra (Whitten et al. 2000 and Laumonier 1997).

Habitat variety
Habitat maps were prepared, principally by merging GIS map themes of: vegetation; soil or geology; slope; aspect; and digital elevation model. Then using ecological groupings, the variety of habitat types were aggregated into a lesser number of major types.

The vegetation of Java, including grasslands and ricefields, was mapped by Schippers-Lammerste in 1965 (see Whitten et al. *op. cit.*). However, considerable alteration in the vegetated landscape of Java has occurred since that time. More recently, MacKinnon et al. 1982 and MacKinnon & MacKinnon 1986) identified natural vegetation based on the agro climatic zones of Java by Oldham (1977). However, neither of these maps, as noted by Whitten et al. (1996) distinguish forests of the weakly seasonal areas, nor difference between east and west of Java. Whitten et al. (*op cit*) produced a map that identified further forest types based on extent of rainy months

and altitude. They recognized mangrove forests, swamp forest on soils permanently or seasonally inundated by fresh water; lower montane forest, upper montane forest, and sub-alpine vegetation; dry evergreen forest; and thorn forest, where there is an average rainfall of about 1,000mm and about nine dry months. However, they did not map these latter vegetation types, because of their small scale.

ESP produced its own version of a vegetation map for Java based on the BAPLAN forest cover map of 2001/2002 and modified it to account for altitudinal zones of forest types and major west to east trends in aridity and climate changes.

ESP follows Whitten et al. (1996) and Whitmore (1984) in taking the usual interface between the lowland and mountain forest types in central Java at 1,200m altitude and the Sub-Alpine Forest above 3,000m. The montane forests between these two vegetation types, were divided and mapped into three zones as follows: Lower Montane Forests (1200m to1500m); Mid Montane Forests (1500m to 2000m); and Upper Montane Forest (2000m to 3000m). The identification of a Mid Montane Forest zone between 1500m and 2000m is somewhat arbitrary, and it may be viewed as a transitional zone between the Lower and Upper Montane Forests. However, such a zone is increasingly identified in Indonesian

rainforests (e.g., PHPA/TNC Lore Lindu Management plan, 2001). Further, botanists have recognized mountain vegetation transition zones in Java occur at 1,200m; 1500m; 2000m; 2400-2500m; and 3000m (Whitten et al.1996). This suggests that their may be also further sub-structuring of the Upper Montane Forest type in Java.

Additionally, ESP recognizes and maps Dry Land Cultivation mixed with bush (shrubland) and Lowland Forests on limestone.

The Dry Land Cultivation mixed with bush type, relates to very disturbed forest, probably mostly as village kebun. However, this is considered to be a rich repository of the relict central Java fauna and worthy to be mapped as a distinct, albeit greatly modified, vegetation type. However, most if not all the ESP vegetation types mapped are greatly modified ecosystems. Whitten et al. (1996) write that so little of the natural vegetation exists, especially in the lowland areas, such that all remaining large patches are of the highest conservation importance. Indeed it is highly unlikely that any natural assemblage of Central Java lowland vegetation survives, with the possible exception of that on Nusa Kambangan, which is only 30,000ha in area and includes some 32 species of plants not currently found on mainland Java (Partomihardjo and Ubaidillah 2004). In fact, it has been argued that the only relict primary forest on Central Java occur on this island- which until recent years has been protected because it is a prison and is off-limits to the public. Recently, however, there have been press statements that the natural habitat of that island is also being rapidly despoiled.

Lowland forest on limestone is also recognized by ESP as a distinct vegetation type. The soils are richer in calcium and magnesium with a higher cation exchange than usually occurs in other soils. The hydrology also differs markedly from other areas with water percolating into deep fissures in the limestone and sometimes emerging far from the collection areas. Limestone forests usually are have a different physiognomy than forests on other substrates usually with a paucity of tree species; and on steeper limestone slopes a distinct herbaceous flora occurs (Proctor et al. 1983; MacKinnon et al. (1996).

Most importantly, ESP follows Whitten et al. (1996) who recognized a major ecosystem boundary that divides Central Java into western and eastern regions. This boundary is approximately coincident with the interface between the WWF ecoregions (Olsen and Dinerstein 2000), four of which fall in Central Java. These are: Western Java Mountain Forest/West Java Lowland Forests and the Eastern Java Mountain Forest/ Eastern Java Lowland Forest. A similar process is being carried out in Sumatra to define a set of ESP vegetation types.

Forest vegetation cover present
The extent of forest cover in each of the selected watersheds was obtained from the BAPLAN 2000 maps and is shown in the ESP vegetation map. The proportion of the watershed that is still covered in forest was used as the selection criteria as follows: highest ranking >20% forested; medium, 10-20% and low, <10%.

Climatic zones present
Oldeman (1977) and Whitten et al. (1996) for example, report that climate is a major determinate of plant distribution in Java. Whitten et al. (1996) considered that the climate classification with the widest currency for environmental work is that of Schmidt Ferguson (1951) and this is the classification used by ESP. It is based on the ratio of dry months to wet months (Q). They formed six categories as follows: Perhumid (Q=0-14%; slightly seasonal (Q=14-33%); seasonal (Q=33-60%); Seasonal (Q= 60-100%); strongly seasonal (Q=100-167%); and strongly seasonal (Q=167-300%). No strongly seasonally zone fell in Central Java.

It is suggested that watersheds that have more climatic zones present are likely to have more diverse vegetation, both in floristic and vegetation structure.

Natural Hazard vulnerability
Short-term hazards include earthquakes, tsunamis, landslides and floods and volcanic activity have been mapped (e.g., see Whitten et al. 1996).

Earthquake danger zone
Earthquakes occur intermittently throughout Java and Sumatra as a consequence of major tectonic fault lines and subduction zones along the Sunda fault line. Earthquakes are not considered to have a lasting impact on biological diversity.

Tsunami danger zone
Impacts from Tsunamis on wildlife may be high such as in Aceh. The Krakatau explosion of 1883 and subsequent tsunami seriously impacted West Java.

Volcanic danger zone
Java and Bali are the most volcanically active islands in the world with some 20 of their volcanoes active in historic times. These include volcanoes in Central Java (e.g., Dieng, Merapi, and Sindoro); 13 others have active solfatara, including Ungaran and Sumbing in Central Java. The volume and nature of volcanic products generally enrich soils, particularly in Central Java where they produce basaltic larva's that flow down to the coasts as alluviums and provide new habitats for wild life, but in the short-term they can eradicate large areas of flora and fauna, such as on the slopes of Merapi in recent years. Threats to wildlife in recent years tends is localized.

River /stream density
The total length of streams in a watershed divided by the area of the watershed provides a measure of stream density. It is reasonable to assume that watersheds with higher stream density values are likely to have a greater extent of riparian vegetation and animals and plants that prefer moister situations. This would create a more variable and denser habitat mosaic that would favor higher biological diversity.

River/stream node density
The number of river/stream connection points per area of watershed provides a measure of the extent to the river network. The more extensive the stream density the greater the number of a particular aquatic habitats formed at the junction of several waterways. This is considered to impact aquatic biodiversity.

Infrastructures: dams roads, villages, factories
The Wilderness Index developed by the Australian Heritage Commission (R. Lesslie, *in litt*., 30 May 1998) is increasingly gaining currency to assess infrastructures etc. The wilderness value of any given point is essentially a measure of remoteness from human influence and is assessed on the basis of: remoteness from settlement (settled land or points of permanent occupation), from access (constructed vehicle access routes), and apparent naturalness (remoteness from permanent manmade structures) (Lesslie and Maslen, 1995). The analysis is carried out on a grid, using data from the Digital Chart of the World (DCW), and remoteness is measured as a distance from each grid point to the nearest feature of each class within a given radius (generally 30 km). Wilderness value is the sum of standardized values for each indicator class. The wilderness value was recently used by WCMC in their paper on "Diversity, risk and priorities: a framework for analysis of river basins. WCMC

Biodiversity series No.8. (www.unep-wcmc.org/information_services/publications/freshwater/5.htm - 33k).

Distribution of springs
The number of springs is a measure of both biodiversity values and water values. Springs are a major source of water to many communities and also may be crucial habitat for amphibians. They also frequently have a belt of vegetation around them that if managed well could continue to have conservation value.

GIS estimated accumulated flow rates of streams
Accumulated flow rates are GIS predictions of the contribution of DAS, Sub DAS and finer levels of DAS to the overall water flow rates. DAS and Sub DAS that have higher flow rates rank higher than those with lower rates.

Extent of detailed 'critical' land.
Departemen Kehutanan has estimated the extent of critical land (*tanah kritis*) throughout Indonesia. This is based on erosionability of soils which is a based on soil type, depth, rainfall and slope. Usually, land with slopes above 45 degrees fall into this category. The extent of critical land in a DAS is an important indicator of soil degradation. For ESP this criterion is a slight conundrum. High levels of critical land probably equate with reduced biological diversity. However, given the ESP SOW and emphasis on rehabilitation and planting of trees, more critical land offers greater potential to plant trees. Overall it is decided that DAS with a large percent of critical land should have a higher selection ranking than DAS with a lower percentage.

2.3.4. ASSESSMENT OF CRITERIA

Where possible, selection criteria were ranked in a quantitative way to reflect the main assessment principals (2.1). Consequently, a high level of pollution and toxic wastes received a low ranking, while an area with high biodiversity values received a high ranking. However, that was frequently not possible in the short time frame of this exercise. Instead, each criterion could also be graded into three qualitative categories as 'high, moderate, or low'- or some modification of these terms.

2.3.4.1. Field Information

When ranking an individual selection criterion for watersheds, it is important that the interviewees scored only the three classes 'high, moderate or low' or some modification of that terminology. They should not be asked to rank within an individuals criterion 1 to 6 for each watersheds. The reason for this was that interviewees frequently will have knowledge of less than the complete set of watersheds targeted by ESP. The pro-forma used for the qualitative 'field' interviews is Appendix I.

2.3.4.2. Field plus Literature Information

Wherever possible, the selection criteria rankings from the qualitative field pro-formas are to be replaced later by qualitative information from literature. Some information may not be obtained from field interviews and will have to be sought from literature and vice versa. This will result in a completed pro-forma that will include both a mix of qualitative and quantitative rankings of the selection criteria- but again the qualitative information will be ranked into three classes (see Appendix II).

2.3.4.3. Analysis of Field plus Literature Information

Some criteria are more important than others. So a loading factor was selected for each criterion. These loading factors had an underlying principle. If the selection criteria directly reflected the value concerned it ranked higher than another criterion that was a mere proxy for the value. For example, the number of critically endangered species in a watershed (direct) had a higher loading factor than the number of vegetation types (a proxy). Impacts that are known to greatly affect biological diversity load higher than those that have a lesser effect. Those fundamental selection criteria that are a focus by ESP, such as water borne diseases, high population density and collaboration opportunity, all loaded highest.

For the overall priority watershed index, each of the three subheadings of criteria contributes equally to the Index. This is achieved by summation of the average rank for each subsection of criteria to produce the Index (see Appendix III). If this is not done, the major subsets i), ii) and iii) of the selection criteria with the highest number of indicators will be weighted and so contribute more to the final watershed priority index.

A modification of this matrix can be used for selecting between sub- watershed areas.

2.3.4.4. Field Trial in Central Java

Six watersheds in Central Java were considered to select the initial priority watershed for ESP implementation in 2006. These were Sengkarang, Bodri, Garang, Progo, and Opak Oyo. Between 12-16 December 2005, the Performa in Appendix I was used to collect information on selection criteria through interviews with staff from the following Indonesian institutions in Semarang and Jogjakarta: BPSDA; BKSDA; BPDAS; BAPPEDALDA; and BAPPEDA. Information gained from various institution staff was not always concordant, although much was. Where information differs between interviewees, a value judgment has to be made. Usually this is readily done, because a clear majority of respondents provide a similar qualitative rank for particular criteria with only a single respondent differing. If there is not a clear outlier other sources were checked to assist make the judgments. From Appendix 1, Progo was selected as the Priority Watershed.

The ESP trip report by Erwinsyah, Kushardanto, Arsyad and Kitchener for Semarang-Jogjakarta Site Selection Trip 13-16 December provides details of the schedule, institutions visited, and staff interviewed.

3. ASSESSMENT OF PROTECTED AREAS IN ESP HIGH PRIORITY PROVINCES

3.1. BACKGROUND

From the late 1980s onwards, the Ministry of Forests (MoF) Directorate of Nature Conservation developed partnerships with international conservation NGOs (INGOs) and bilateral development agencies to strengthen their management capacity. In 1990, MoF had joint programs with WWF (est. 1962) and the Asian Wetland Bureau (est. 1987). Subsequently, five more international NGOs established programs and representative offices and by 2003 all but two of these had converted to Indonesian 'franchise' NGOs. The majority of MoF-INGO programs focused on two or more national park 'projects,' and some INGOs became contractors for components of park management mega-projects managed under MoF-aid agency partnerships. In addition, development projects such as USAID's NRM and the Biodiversity Conservation Network (BCN) provided policy development support and invested in the development of local civil society partners and community groups.

This is because PAs were difficult to integrate into the political economy of the Suharto era because, unlike logging or plantation concessions, they did not generate local or State revenue.

Gazettement of a reserve signifies the acceptance of a PA's existence by local government and leaders because it gives PA officials recourse to local courts to deal with instances of land encroachment, resource extraction and poaching. To date, only the Kerinci-Seblat National Park has been gazetted and this only after significant amounts of donor aid. Marine protected areas (MPAs) are a more recent phenomenon in Indonesia relative to terrestrial PAs. Currently, there are six marine parks included in the Indonesian PA system, which still fall

Box 3. International NGOs as Conservation Management Contractors.

The Indonesian Ministry of Forestry frequently partners with International NGOs to facilitate management of PAs for reasons that include the need to:

- Develop knowledge of the natural resources of lands in the protected area 'estate'.
- Enhance their limited human, technical and financial resources.
- Demonstrate commitment to biodiversity and PA ideals to the international community.
- Bolster the standing and legitimacy of park management units to local government.
- Establish a line of communication with communities living in protected areas.

With one or two exceptions (e.g., Bunaken Marine National Park), the last two of these needs have proved difficult to establish and sustain. To date, almost half of MoF-INGO partnership projects have closed within eight years, and the majority of PA management projects managed by development agencies have been unable to sustain activities beyond five years. (Rhee et al. 2004).

under the authority of MoF. The new Ministry of Fisheries and Marine Affairs has initiated talks with MoF to have the parks reassigned from MoF to their ministry. Presently, there is a Memorandum of Understanding between the two ministries and they are "co-managing" the system. There are also a number of other mainly terrestrial protected areas that have marine components.

Many of the high country protected areas have a crucial role to play as watershed catchment areas and therefore their natural resource management scenarios and practices are of vital importance to the success of ESP initiatives.

The lesson to be learnt from concerning international (and national) NGOs, is that over the last 20 years they have had limited success in achieving conservation gains within (and outside PAs) in Indonesia (Box 3). Consequently, it is recommended that ESP contractors are provided with clearly defined SOWs and outputs and that their progress is closely monitored to meet clear indicators of success. Further, it may be better to break down conservation activities required in PAs, particularly the three ESP focused Tahura, into smaller packages that can be coordinated by ESP. These smaller packages could then be bid to a restricted number of candidate consultants, including suitable local consortiums promoted by ESP.

3.1.1. CATEGORIES OF PROTECTED AREAS IN INDONESIA

(Information obtained from http://www.
Dephut.go.id/INFORMASI/STATISTIK/Stat2002/PHKA/PHKA.htm)

Most of the areas listed below were relatively undisturbed when designated. However, in recent times many have suffered serious degradation as a result of encroachment, illegal removal of non-forest resources, fires, and illegal logging.

Taman Nasional (national park)
Generally large areas of outstanding natural value with high conservation and importance and recreation/tourism potential, usually with reasonably good access for visitors. All national parks require management plans, including zonation to exclude humans from core and wilderness areas as well as use zones types for various human activities that are not inimical to the core conservation values of the parks. Central Government management.

Cagar Alam (nature reserve)
Areas in need of strict protection, containing undisturbed important habitats (sometimes fragile) of great conservation value (containing rare, endangered, vulnerable and endemic species or assemblages of species) and unique natural sites. Central Government management.

Taman Hutan Raya (Tahura)
Protected area for the collection of plants and animals either native or exotic, for use in research, scientific knowledge, education which supports cultivation of plants or animals, culture tourism and recreation. Provincial Government, Dinas Kehutanan, management.

Suaka Margasatwa and Suaka Alam (wildlife and game reserve)
Generally medium or large areas of relatively undisturbed habitat of moderate to high conservation importance, where management may be appropriate. Provincial Government, Dinas Kehutanan, management.

Taman Wisata Alam (recreation park)
Small attractive and interesting natural areas or landscaped sites with easy access for visitors. Conservation values are usually low such that they would not be threatened by visitors. Provincial Government, Dinas Kehutanan, management.

Hutan Lindung (protection forest)
Medium to large areas of natural or planted forest on steep high slopes, usually above 45 degrees, such that they are susceptible to erosion. These are areas that are crucial set asides for the protection of catchment areas and their underlying aquifers. Their conservation values are not deemed as important as their water catchment values. Although in practice, many of these areas are a very important part of the general biodiversity conservation domain. Provincial Government, Dinas Kehutanan, management.

3.2. PROTECTION AREAS IN JAVA

Rhee et al. (2004) consider that while there is too little of Java that is in conservation protected areas, the national parks that are in Java have been well selected and, with the possible exception of Pulau Seribu, are the centers of diversity for some groups of animals and plants. They state that sub-alpine and montane forests are especially significant for the conservation of biodiversity of Java, because they are among the most intact areas of forest remaining. Further, they contain a number of endemic species as well as many lowland species which are able also to also live in the low to middle montane zones. For this reason, the national parks that are mainly sited in montains, such as Gunung Halimun, Gunung Gede Pangrango and Bromo Tengger Semeru National Parks are of a high priority. However, all these Parks receive considerable management support from the Government of Indonesia, and Gunung Gede-Pangrango is particularly well staffed relative to other parks in Java. While all the mountain parks are threatened from human activities and require considerable support, these threats are not as severe as those experienced in national parks in the lowland areas. Consequently, the need for support to manage their biodiversity is less than is the case of the lowland parks.

Damaging land use practices over the last 150 years have left only small, scattered remnants of Java's natural ecosystems, especially in the lowlands. For this reason, the existing low lying national parks in Java are essentially 'habitat islands' embedded in an agricultural landscape. This makes the national parks containing the biologically rich lowland forests (Ujung Kulon, Meru Betiri, Baluran and Alas Purwo) the top priority for conservation efforts in Java. Additionally, Meru Betiri is perhaps the most important marine turtle rookery in both Java and Nusa Tenggara, which confirms further its position as a top priority for conservation.

All these low-lying parks are currently being degraded by human activities, including removal of non-timber forest products and trees for construction purposes. This damage is greatest in Baluran National Park, which recently has been severely encroached. Hunting of its wildlife has also increased dramatically. Both Baluran and Alas Purwo National Parks represent the drier lowlands. Both require support for the management of their biological values. However, of these two parks, Alas Purwo National Park has the more intact ecosystems and Java's biodiversity would benefit more by focusing effort to manage the threats to Alas Purwo National Park, rather than Baluran National Park, if a choice has to be made between these two Parks. Ujung Kulon National Park retains an impressive assemblage of Java's lowland rainforest fauna, including the flagship conservation species, the Javanese Rhinoceros.

Of the lowland national parks in Java, Ujung Kulon is considered the most important for support to conserve its biodiversity, followed in order by Meru Betiri, Alas Purwo and Baluran.

The Nusa Kambangan relictual lowland plant assemblage, including rare and endemic species of plants such as the Giant Voodoo Lily (*Amorphophallus decus-silvae*), urgently requires additional protection to prevent the destruction of its forests by local villagers.

The Marine National Park Kepulauan Seribu suffers greatly from over fishing and damage to its reefs, particularly from physical damage caused by anchoring boats, pollution and general tourism. It continues to be threatened and degraded because of its proximity to Jakarta. It is in the direct path of huge off-shore water plumes that carry pollutants onto its reefs. The Marine National Park, Karimunjawa, off Semarang, has suffered from over fishing and damage to its reefs. However, it was considered by Rhee at al. (2004) as the priority choice for marine conservation effort in the waters around Java. Relatively extensive, but disturbed mangrove forest is confined to Alas Purwo National Park and on two small islands on the north coast, D. Dua and R. Rambut. These isolated mangrove patches are undoubtedly centers for a complex mangrove associated relictual community of animals and plants.

3.2.1. WEST JAVA

Of the 51 conservation protected areas in West Java, 29 are small to moderate *Cagar Alam* with an average area of 1,664ha (range 2ha -15,000ha), three *Suaka Margasatwa* (90ha-8128ha), 15 small *Taman Wisata Alam* with an average area of 230ha(5ha-1250ha), two large *Taman Nasional* (21,975ha and 113,357ha), one small *Tahura* (590ha) and one large Game Reserve (12,420ha). The *Taman Nasional* is important and is 63 % of the total area of PAs. Additionally there is 240,402ha of protection forest.

3.2.2. CENTRAL JAVA

Of the 37 conservation PAs in Central Java, 29 are small *Cagar Alam* with an average area of 98 ha (range 1ha- 1,328ha), two small *Suaka Margasatwa* (104ha & 7ha), three *Taman Wista Alam* (64ha, 2100ha and 126ha), two recently created *Taman Nasional* (6,410ha and 5,725ha) (Anon 2005c) and a single *Tahura* (231ha). Clearly the two recently created *Taman Nasional*, which have a combined area of 12,135ha or more than four times the combined area of the other 34 protected areas, are extremely important, particularly as they are also important watersheds for water piped to the Magelang region and Jogjakarta. Additionally there is 32,885ha of protection forest.

3.2.3. EAST JAVA

Of the 27 conservation protected areas in East Java, 16 are small to moderate sized *Cagar Alam* with an average area of 688ha (range 3ha- 6100ha), two *Suaka Margasatwa* (3,832ha &14,145ha), three small *Taman Wista Alam* (10ha, 92ha and 196ha), four large *Taman Nasional* (25,000ha, 43,420ha, 50,276ha & 58,000ha) and a single large *Tahura* (25,000ha). Although the *Taman Nasional* are 77% of the total area of PAs, there are a number of moderate to large *Taman Wisata Alam*, large *Suaka Margasatwa* and the *R. Suryo Tahura* in this Province. Additionally there is 315,505ha of protection forest.

3.3. PROTECTION AREAS IN SUMATRA

Sumatra has a rich biodiversity similar to that of other Sunda islands, but slightly impoverished for most groups when compared to Borneo/Kalimantan. It has a number of unique and endemic fauna not found elsewhere, and retains a higher representation of the Asian mainland fauna and flora than elsewhere in Indonesia. Sumatra had extensive lowland forests, which are the richest habitats for biological diversity. However, the continuing degradation of Sumatran Lowland Rainforests and their associated faunas continues, such that the World Bank (2001) predicted that shortly all these forests on Sumatra will have a damaged vegetation canopy cover.

Of the six Sumatran national parks with Lowland Rainforest, those that are of a landscape scale and include mountain forests, particularly low Montane Rainforest (also inhabited by many species from the Lowland Rainforest) should be singled out for urgent conservation support. This is particularly true because with the destruction of the Sumatran lowland forests, it is predicted that loggers will move to the Peat Swamp Forests and to the hilly and lower mountains to obtain their timber. Thus, among the above group of six Parks, Gunung Leuser, Kerinci Seblat and Bukit Barisan Selatan are of the highest priority. However, Siberut National Park, because of its unique endemic animal assemblage, should also be elevated to the highest priority for support.

The largest and most important national parks in Sumatra are Leuser and Kerinci Seblat which are also trans-provincial parks. Their successful management necessitates the collaboration of a number of informed governments at provincial and more local levels, as well as civil society. Consequently, considerable support needs to be provided to inform all stakeholders of the value to them of the environmental services provided by these parks.

Rhee et al. (2004) recommend as a high priority the recovery and sensitive management of lowland rainforest habitat in the following National Parks: Leuser (both a Biosphere Reserve and a World Heritage Site), Siberut (International Biosphere Reserve), Kerinci Seblat (World Heritage Site), Bukit Duabelas, Bukit Tigapuluh, Bukit Barisan Selatan (World Heritage Site), Way Kambas, and a refocus on protecting Berbak (International Ramsar Site)and Sembilang National Parks, because their peat swamp forests and fresh water swamp forests, which will

likely soon become the target of illegal logging and encroachment. Tesso Nilo Forest and its current connections with Kerumutan, Rimbang Baling and Bukit Bungkuk Wildlife Reserves and Bukit Tiga Puluh National Park were also highlighted for special management of lowland forest. They state further, that there is a need for a review the limited success or failure of previous attempts to manage these PAs and develop different management strategies. There would appear to be a need for longer project time frames, different administrative structures and different funding channels for project implementation.

In particular, it would be helpful to support the rehabilitation of forests and the re-design of existing *Acacia* and oil palm plantations to allow for the establishment of wildlife corridors, which would to allow elephants and other mobile animals to move freely between forest patches.

Rhee et al. (2004) highlight the important need to protect upper catchments of the major river systems and a conservation strategy for the multiple use and sustainable management

of natural resources in their water basins. This would require in some cases the identification of the catchment areas and associated water basins, the strict enforcement of existing logging regulations on steep slope lands, possible removal of shifting agriculture from these catchments and an integrated and transparent spatial planning process forged between both upstream and downstream stakeholders. They also call for support for the conservation of the Sumatran coastline through a program to rehabilitate mangrove forests, once widely distributed around the island. This would require a review of development policies regarding fish and shrimp ponds (*tambak*), the presence of which are a major factor in the destruction of mangrove communities in Sumatra, as well as regulation of the cutting of mangroves for firewood, construction purposes and making of charcoal.

3.3.1. WEST SUMATRA

Of the 24 conservation protected areas in West Sumatra, 16 are moderate to large *Cagar Alam* with an average area (28,754ha; range 3ha -232,467ha) much larger than is found in Java, one *Suaka Margasatwa* (4,000ha), three small *Taman Wisata Alam* (12.5ha-570ha), two very large *Taman Nasional* (190,500ha and 375,934ha), one very large *Tahura* (71,809ha). The *Taman Nasional* is 51% of the total PA area. Additionally there is 910,533,000ha of protection forest.

3.3.2. NORTH SUMATRA

Of the 26 conservation protected areas in North Sumatra, 10 are small to moderate *Cagar Alam* with an average area much smaller than is found in West Sumatra (1,382ha; range 1ha - 6,970ha), four moderate to large *Suaka Margasatwa* which average 21,388ha (5,657ha-40,330ha), six small *Taman Wisata Alam* (7ha-1,964ha), two very large *Taman Nasional* (108,000ha-190,500ha), one very large *Tahura* (51,600ha). The *Taman Nasional* is 65% of the total PA area. Additionally there is 1,844,000ha of protection forest.

3.3.3. ACEH

Of the 8 conservation protected areas in Aceh , two are small to moderate *Cagar Alam* (300ha & 23,024ha), two moderate to large *Suaka Margasatwa* (3,900ha & 227,500ha), two marine *Taman Wisata Alam* (3,900ha & 227,500ha), one *Tahura* (6300ha) and one very large *Suaka Alam* (102,500ha).

4. ESP SITE-BASED CONSERVATION PLANNING & MANAGEMENT

4.1. PRINCIPALS

Between 1980 and the early 1990s a paradigm persisted that management of natural resources in the developing world requires the participative involvement of the wider community or community – based natural resource management (CBNRM). And that the enforced exclusion of the local communities from natural resources, particularly as guarded in PAs, is doomed to failure. CBNRM stressed the need not to exclude local people, either physically from PAs or politically from the conservation policy process, but to ensure their participation (Adams and Hulme 2001). Community conservation initiatives include community-based conservation, community wildlife management, collaborative or co-management, community-based natural resource management, state/community co-management and integrated conservation and development programs (Barrow and Murphree 2001). Hutton et al. (2005) argue that towards the end of the 1990s, following critical reviews of CBNRM (e.g., Oats 1999 and Terborgh 1999), USAID and other donors appear to have shifted away from CBNRM. They base their evidence for this assertion not on stated donor policy but on indirect evidence whereby donors increasingly favor funding away from CBNRM towards trans - boundary parks, payment for environmental services (PES), public – private partnerships and 'mainstreaming conservation and sustainable use of biological diversity into relevant sectoral or cross sectoral plans, programs and policies. They argue that these funding areas in effect support the exclusion of the community from the natural resources that they need for their livelihoods.

Hutton et al. (2005) review the extensive literature on CBNRM, including in Africa and Indonesia, and agree that CBNRM is indeed flawed in practice but "not because communities are inherently unable to control themselves or their resources" but rather because of: poor CBNRM project design; lack of capacity to implement projects; and a general lack of sufficient control by communities of the resources (resultant from inadequate policy and legislative reform). They continue by stating that where conservation programs tie up natural resources sought after by resource-dependent agrarian communities, locally driven processes are the biggest threat to PAs, a situation that will be exacerbated if genuine democracy takes root and local people gain political power. In these conditions, science-led solutions alone will not be enough to safeguard biodiversity. Nor will authoritarian approaches. "*Establishing legitimate processes by constructively working with people will be the most feasible and morally just way to achieve long-term nature protection and this will inevitably result in programs of sustainable use that revolve around communities".*

This document emphasizes two activities of CBNRM, namely community (stakeholder) participation in the development of conservation management action plans and the structured role for the community in the process of management. While the proposal does

not focus on other CBNRM activities, such as community wildlife management, community-based natural resource management and integrated conservation and development programs, should these emerge from the stakeholder Management Action Planning process they would be welcomed as potential conservation activities.

ESP will develop conservation management action plans through a collaborative stakeholder process similar to that recommended for USAID staff (Anon 2005). This process that identifies a limited number of important conservation objectives (targets) for each focus area and then determines the most practical and feasible (tactical) solutions to abate threats to each of these conservation objectives. The conservation objectives will include the interconnected ESP natural resource trilogy of water, land and biological diversity values.

These conservation management action plans will be developed initially at the level of Sub-watersheds (Sub DAS) by forming stakeholder groups that represent villages throughout the Sub watershed, as well as other stakeholders that operate at the level of the Sub-watershed

Management action plans will also be developed for the broader watershed areas (DAS) using similar stakeholder approaches. Integration will be sought between the two stakeholder groups as well as the development of processes that will enable these stakeholder groups to achieve a level of recognition to allow them to function as supervisory bodies and carry out monitoring and evaluation and periodic review of these actionable management plans. As well as seek funds to support implementation of the action plans.

Assistance will also be provided to assist the conservation management of protected areas that are in or abut ESP priority watersheds. This assistance may include working with the PA authorities to develop, for example, PA management plans, identification of habitat groupings – conservation management zones – and conservation targets, and design of rapid biodiversity inventory surveys.

The ESP Scope of Work provides some broad strategic guidelines for biodiversity practice in the Priority Watersheds, as well as some general areas for the implementation of ESP activities. These include:

- Develop multi-stakeholder watershed management boards, tapping into and supporting available local resources from government, university, NGOs, private sector and local communities to generate the best possible plan.
- Identify key areas of high biodiversity value and develop conservation plans in conjunction with local communities, NGOs, the private sector, and local government.
- Establish separate upper-watershed and lower-watershed user groups to build capacity, and then bring these groups together to negotiate upper watershed *versus* lower-watershed conflicts.
- Build local capacity for spatial planning and mapping/GIS of relevant physical, administrative and social aspects of watershed and biodiversity conservation areas, to be used as a tool for development planning and conflict mitigation.
- Develop sustainable financing mechanisms, likely to include valuation of and payment for upper-watershed environmental services by lower-watershed users.
- Conduct public awareness campaign to create awareness, ownership and pride in local integrated watershed management plans".

IUCN (1977) stated the basic idea of collaborative management is a partnership among government institutions, local community and resource users, non-governmental institutions and other stakeholders to negotiate and determine an appropriate framework for the authority and responsibility of managing a specific region or resources. In Indonesia, Collaborative management has been implemented only at Bunaken National Park, Kutai National Park, Komodo National Park and Gunung Ciremai or Meru Betiri National Park. It is currently still being tested at Kayan Mentarang National Park. No review or evaluation of the success or otherwise of these collaborative efforts is available. Recently, however, there has been a major development in favor of collaborative management in protected areas (*Kawasan Suaka Alam* and *Kawasan Pelestarian Alam*) with the enactment of *Peraturan Menteri Kehutanan Nomor*: P.19/Menhut-II/2004 (see details in Anon (2005b).

One challenge is to create a conservation culture in the ESP High Priority Provinces. Sudibyo (2003) noted that decentralization has opened up new opportunities in the formal education sector to incorporate tailored environmental education into local curricula since local schools now have the authority to determine 20% of their curriculum. Unfortunately, most schools are unprepared to take on this task due to the lack of qualified human resources. Adult education approaches that address both governance and conservation issues should also be considered. Farmer field school models of training have proved successful in Indonesia and are extremely relevant and effective in the context of decentralization. There is also generally a lack of appropriate skills and specialization in staff of national parks and conservation centers.

The threat to endangered species of habitat loss is generally more profound than other threats, such as hunting or pollution. The habitats and ecosystems that endangered species need to survive must be preserved both inside and outside of protected areas.
Lack of knowledge continues to be a major issue in species conservation. We may not know enough about an endangered species' habitat needs, reproductive cycle, or current threats to develop appropriate conservation action plans. Consider also that there are hundreds of species in Indonesia yet to be described, many of which may be as threatened as the known species. In the past, much conservation investment was focused at the level of science in the field. As Indonesia's crises have grown, along with the need for visible results, many organizations have refocused to the policy level or have emphasized community involvement, to the extent that field-based science is now lacking in many areas and organizations.

Conservation planning in watersheds needs to take account of planning by the Indonesian government for "critical lands" and the national land rehabilitation program provide some insight into land and watershed management needs. The main activity in rehabilitation efforts is planting tree species that provide benefits to the local communities, balancing forest function and people's needs. The Ministry of Forestry has recently launched a National Land Rehabilitation Program ("Movement"). Over a five year period, this movement, known as *GN RHL*, seeks to rehabilitate 3.1 million hectares of forest and critical land in 68 priority watersheds involving 27 provinces and 242 districts and cities.[1] The land rehabilitation program is focused on the most severely degraded lands. Two thirds of the program is located on areas with "small trees and undergrowth, open land, dry land agriculture mixed with undergrowth" (Land Cover Classification I). The other third of the program is focused

[1] Critics of this approach (e.g., J.Post editorial, Jan. 23, 2004) point out that planting 600,000 ha per year, even if successful, will not help much if deforestation continues as 2 million ha per year.

on dry secondary forest, secondary swamp forest, and secondary mangrove forest (Land Cover Classification II). This reflects the focus of the program on restoring watershed and ecosystem services and supplying commercial timber. Rhee et al. (2004) concluded that "The GoI's forest and watershed rehabilitation program is a major effort*, but is not focused on producing biodiversity protection and benefits*. By focusing on critically degraded forest areas, especially uplands and watershed areas, the program will help toward restoring some habitat areas and ecosystem functions, with some positive influence on biodiversity conservation. Additional efforts could be designed to complement the national program in areas where it is working, or to supplement it in areas where it is lacking. Relatively more of the program's resources are focused inside the forest estate, while most of the critical lands are outside the forest estate.

Degradation of coral reefs, mangrove forests, and sea grass beds from conversion, destructive fishing practices, and commercialization are major issues in the coastal and marine sector. These concerns will be aggravated in coming years by rapid growth, urbanization, and industrialization in the coastal zone, where most people live, as well as intensification of fishing effort based on strategic policies of the GoI.

4.2. PRACTICE: DEVELOPMENT OF MANAGEMENT ACTION PLANS

4.2.1. GENERAL

Emphasis is placed on the development of tactical actionable management plans that can be rapidly developed and carried out at both the level of a village or groups of villages and for entire watersheds. Initially, priority is given to action plans that can be funded from village resources with little requirement for additional funds and where the majority of work can be carried out by villagers. The steps involved in this process follow:

4.2.2. PRIORITIZE THE HCV FOCUS AREAS

List the HCV areas (selected through the process described in earlier sections) in order of priority for conservation management activities. Depending on their size and distribution, each watershed was sub-structured to Sub watershed or Sub Sub watershed. Implementation sites then focused on these finer scale watershed units, rather than on government administrative groupings.

4.2.3. IDENTIFY STAKEHOLDER GROUPS FOR CONSERVATION PLANNING OF HCV AREAS

Multi-stakeholder watershed management Boards exist in many areas. For example, they are established in Java by BPDAS as *Forum Komunikasi DAS* and in Jogjakarta *as Panitia Pengaturan Tata Air.* ESP works with these already established forums to develop specific stakeholder groups to carry out the action management planning process at the level of Sub Watersheds as well as a 'higher' grouping of stakeholders to produce companion plans for entire watersheds.

The document USAID/ARD (2005) provides background and guidance to the selection of stakeholders. These stakeholders should have a direct link with the areas and should be involved throughout the management planning and implementation process.

Box 4. Principal Steps to Develop Rapid Management Action Plans

- Form Stakeholder group appropriate to management scale.
- Gather relevant background information. Namely:
  - evaluate existing spatial & work plans.
  - evaluate existing biophysical information.
  - evaluate socioeconomic information.
  - produce particpatory land use maps.
- Identify conservation objectives.
- Analyze threats to each objective.
- Analyze sources of threats.
- Conduct situation analysis to determine threats that can be abated.
- Identify tactical solutions to abate threats.
- Describe Actionable Management Plans.

When selecting stakeholders, even for the development of a Sub- watershed management action plan, not all villages can be represented because of the necessity to keep the stakeholder group to a workable size of about 50 participants. A system has been worked out that allows villages to group themselves, and a for village groups to select one or two representatives to participate in the planning process.

Whether villages are sensible 'operational' management planning groupings will depend on a variety of factors, such as whether they have physical connectivity on a river system, similar land-use types, similar farming and marketing practices, topographic integrity, cultural and religious integrity, and a history of relationship. To these village representatives, will be added stakeholders representing government, fauna and flora, business etc, who operate at the level of the Sub Watershed.

When selecting stakeholders for the development of action plans for an entire watershed, representatives from the various Sub- water catchment planning processes will also participate, as well as stakeholders who represent and are knowledgeable about factors that operate at the wider landscape level of entire watersheds.

4.2.4. EVALUATE EXISTING SPATIAL PLANS/WORK PLANS

All government spatial /work plans pertaining to HCV areas in the selected watershed, in and outside PAs, need to be examined for their impact on possible management scenarios. They also need to be evaluated for their logic; ii inclusion or otherwise of biological conservation needs; iii potential conflict between the various plans; and iv their potential role in resolving current land-use conflicts. In particular, relevant spatial plans/ work plans from BPDAS, BAPPEDA, BAPEDALDA, PHKA protected area management plans and PERHUTANI working plans should be examined. A summary report then should be prepared highlighting aspects of spatial planning that need resolution and clarification, along with recommendations for entry points for ESP to assist develop integrated multiple land use plans within the focus areas. At completion of this assessment, clear proposals should be made as to how to best achieve delivery of recommendations.

4.2.5. CONDUCT INFORMATION GAP ANALYSIS

This analysis was conducted with a stakeholder group in each high priority watershed. The socioeconomic data, such as village population numbers & age and sex structure, health data, domestic stock etc., was of much higher quality than biophysical data.

ESP, because of their GIS and research capacity is instrumental in this gap analysis. Some of the primary maps on habitat types, critical land distribution, distribution of endangered, vulnerable and endemic species and assemblages produced by ESP for their

Selection of activity sites are essentially important background information for the planning process and of great assistance in the stakeholder driven process to identify conservation objectives.

In addition, the DAI "Developmental Pathways" approach to integrated spatial planning is being used. This approach is an objective-oriented flexible framework to plan conservation interventions and select the spatial maps of greatest potential for a specific conservation objective.

An example of this developmental Pathways process was the rapid two day exercise run in Cimacan and Sukatani villages in Cipanas, upper Cikundul watershed in April 2006 (Box 5). Figure 2, shows the participatory land use maps of the Gunung Putri community in Sukatani village. The ESP team used community sketch maps developed during PRA activities to identify important landmarks and boundaries. They then traveled to the sites with a local facilitator. An important finding was that a recent government decision has modified the official National Park boundaries (Figure 2). The community is adjacent to the Park and has been farming on the lands bordering the Park for many years. Vegetable farming on steep slopes using terracing is common for farmers in

Box 5. An ESP Exercise in Integrated Spatial Planning and 'Developmental Pathways" for Local Communities in Cipanas, Upper Cikundul Watershed

- Practical field training was carried out in Cimacan & Sukatani villages.
- Particularly relevant were the spatial relations and land use activities related to farmers growing vegetables inside the newly expanded boundaries of Taman Nasional Gunung Gede Pangrango.
- Cikundul participatory land use maps (Figure 2) identified:
    - land available for farming;
    - percentage of farmland located on steep slopes and within expanded Park boundaries;
    - location of threatened water sources (rivers & springs);
    - priority land for rehabilitation; and.
    - updated forest cover using satellite imagery.
- These maps:
    - fostered community participation and adoption of local knowledge in the planning process;
    - assist in the identification of conservation objectives;
    - promoted a cross-cutting approach that links government institutions;
    - transferred innovative spatial methods and capacity building;
    - created transparency for open dialogue and debate for community involvement in conservation action plans;
    - captured best practices and communicating information across administrative boundaries; and
    - identified synergies between ESP components (Bouvier 2006).

this community. The modification of the Park boundaries, if it translates into conversion of farmland back to secondary forest, will have a deep impact in farmer's ability to sustain vegetable production. The land is intensely cultivated year-round. The team traveled to the old boundary of the I Park where

Recent forest clearing for vegetable farming was observed. Participatory land resources inventory helped identify the amount of land available for farming, percentage of farmland located on steep slopes and within the new Park boundaries. Water resources are scarce during the dry-season: the community's main water source is in Sindangjaya village and the stream that forms the border between the two villages runs dry during the dry-season. The farmers indicated that the springs in the area had decreased water flow during the past few years. A poultry farm located downstream is using water from a spring in the Park and there have been discussions between upstream communities and the poultry company about available water resources. Figure 2, does not include a complete land resources inventory. Follow-up activities are planned to update and validate this land resources map inventory with the local community (Bouvier 2006).

The discussion generated with villagers by the Figure 2 map highlights the value of participatory land resources inventory maps for local activity planning. Such maps can be used to identify opportunities for multiple objectives, for example: mediation/facilitation between the farmers and the Park Authority, land rehabilitation activities, training to improve water resources management, and activities for improved community sanitation.

The field-based applications included GPS data collection, real-time navigation using maps and satellite imagery, and ground truth/validation of land cover inventories.

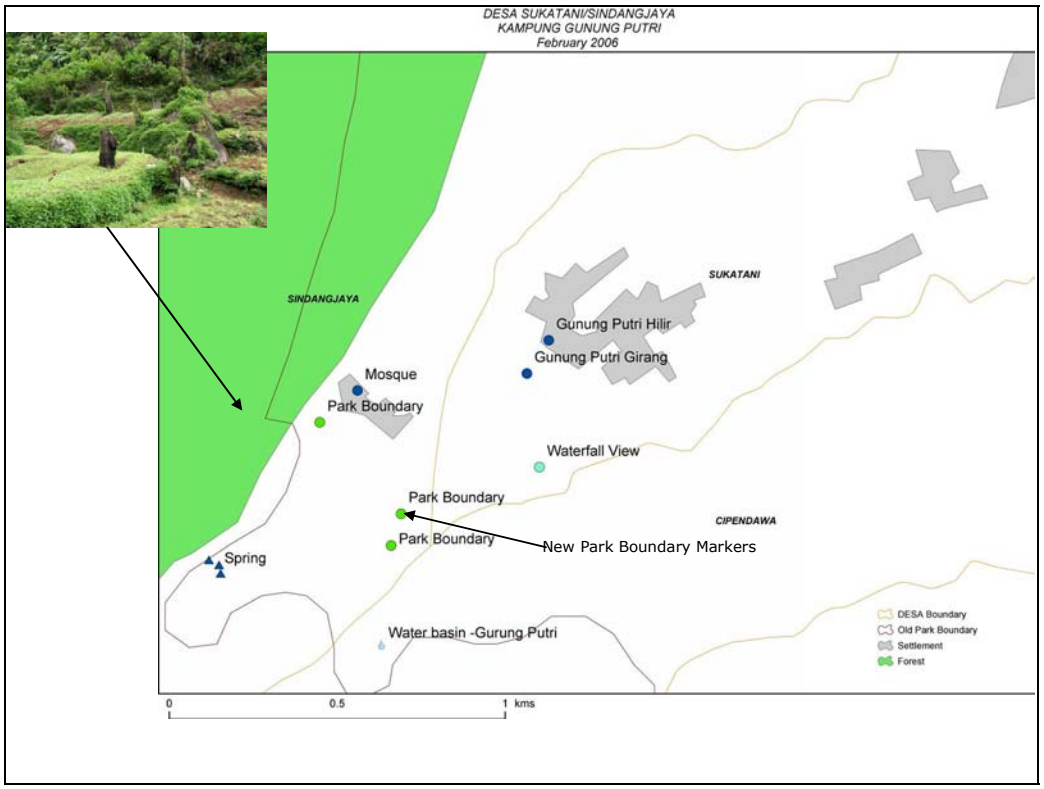

Figure 2. Preliminary participatory land-use map of Desa Sukatani and Sindangjaya produced by DAI GIS experts in collaboration with local villagers, Cianjur District, West Java.

ESP has developed a centralized information system (TAMIS) for project administration, logistics management and monitoring of outcomes. TAMIS has been linked to spatial data to develop a GIS View that integrates relevant information on spatial information, which is then made available to ESP Watershed conservation management teams through a user-friendly internet-based application. This facility is supporting a consistent ESP data management approach (and types of data collected) and allows for ease of access to both information and analysis of spatial relationships.

4.2.6. SELECT A WORKSHOP FACILITATOR AND THE FACILITATION PROCESS

An experienced facilitator familiar with this process was essential for its success. Most importantly the stakeholder workshop may be seen to be loosely guided by ESP but in no way was the process and its results perceived by the stakeholders as being driven by ESP. The Stakeholders felt ownership of the results of their planning process. The facilitator was aware of the scope of the enquiry and that actionable conservation management solutions need to be obtained in a short time frame of about 6-8 days. That means that the facilitator needed to strongly guide the time allocated to threat analysis, source analysis, and feasibility analysis and restrict these analyses to a short list of no more than six conservation targets. Throughout the workshop, the facilitator required a support staff to generate information required by the stakeholders and provide them with informed clear feed-back.

The development of adaptive management scenarios for each of the tactical management solutions identified by stakeholders was by a smaller specialist group in which ESP played a major role. Namely, to establish the baseline situation for each conservation objective, develop implementation activities, outputs, milestones, indicators of success and M&E. These management scenarios were then be taken back to the stakeholder plenary sessions for approval and for ranking of importance.

Box 6. Summary of Potential Watershed Biodiversity Planning Targets

- Terrestrial Ecological Systems & Communities or Suitable Proxies.
- Aquatic Ecological Systems & Communities or Suitable Proxies.
- MarineHabitats.
- Species Targets including:
  - IUCN Redlist species;
  - GoI protected species;
  - endemic species;
  - vulnerable species;
  - culturally important species;
  - economically important species;
  - charismatic species;
  - keystone species; and
  - migrating and wide ranging species.
- Special Consideration Including:
  - species or habitat aggregations;
  - species groups; and
  - biodiversity hotspots.

Modified from TNC (2000).

4.2.7. IDENTIFY CONSERVATION OBJECTIVES (TARGETS) IN EACH WATERSHED FOCUS AREA

This identification was carried out with the stakeholder group. Given the paucity of information available, these conservation objectives could be a particular taxon, such as an endemic, rare or endangered species, an assemblage of species, for example, a particular guild of birds or assemblage of orchids, a biodiversity proxy, such as a particular habitat

type, e.g., forest on limestone (See Box 6). Generally it is preferred if the list of conservation objectives is kept at a low number. Examples of such a selection process are available in TNC (2000).

4.2.8. ANALYZE THREATS TO EACH CONSERVATION OBJECTIVE (TARGET)

The ESP/SOW states that illegal logging is the greatest threat to Indonesia's forests and watersheds today. Forests play a crucial role in watershed management due to their ability to maintain water quality through filtration and to maintain water flows by capturing rain water in root systems during the rainy season and then slowly releasing water during the dry season. Forests also reduce run-off, prevent erosion, and landslides. Widespread erosion from deforestation is causing severe sedimentation in many rivers (and threatening hydroelectric dams. The impacts of deforestation on water supply have been clearly witnessed throughout Indonesia.

Conflict over forest resources are discussed in Section 4.1 above.

Deforestation has left millions of hectares of degraded, abandoned state-owned forest lands that are vulnerable to fire, have altered water retention capabilities, but may not be legally transferred to private ownership. The Basic Forestry Law of 2000 acknowledges the right of communities to have durable access rights to these state forest lands. However, the implementing regulations for community forestry have never been issued. Recent assessments conducted by USAID and the World Bank indicate that millions of Indonesian farmers, currently farming plots less than 2 hectares in size, would experience significant economic benefits from being granted access to degraded state forest lands. This rapid loss of natural forests is also threatening the viability of Indonesia's huge pulp, paper, and wood products industries. Unless the pace of reforestation rapidly increases, these industries will collapse and many jobs will be lost. Forestry implementing regulations which provide land access security to farmers would create the incentive to mmillions of farmers in communities across Indonesia to make the long-term investments needed for cultivating trees to supply the pulp, paper, and wood industries. Reforestation would also restore critical watershed functions to vast areas of Indonesia which have become badly degraded.

Many of Indonesia's protected forests are in upper catchment areas with mineral deposits. Mining can pose a serious threat to forests, biodiversity, and watersheds when trees are removed, access roads are improperly placed, animal habitats are destroyed, and water flow is impeded. Impacts of mining on rivers include sedimentation, acidity, and metals loading. In addition, small-scale mining can also have negative impacts on watersheds and biodiversity. Small-scale gold miners' use of mercury is a widespread problem in Indonesia. Not only does mercury exposure cause immediate human health impacts, but mercury also can destroy the economic value of agricultural and marine production areas with consequent declines in biodiversity.

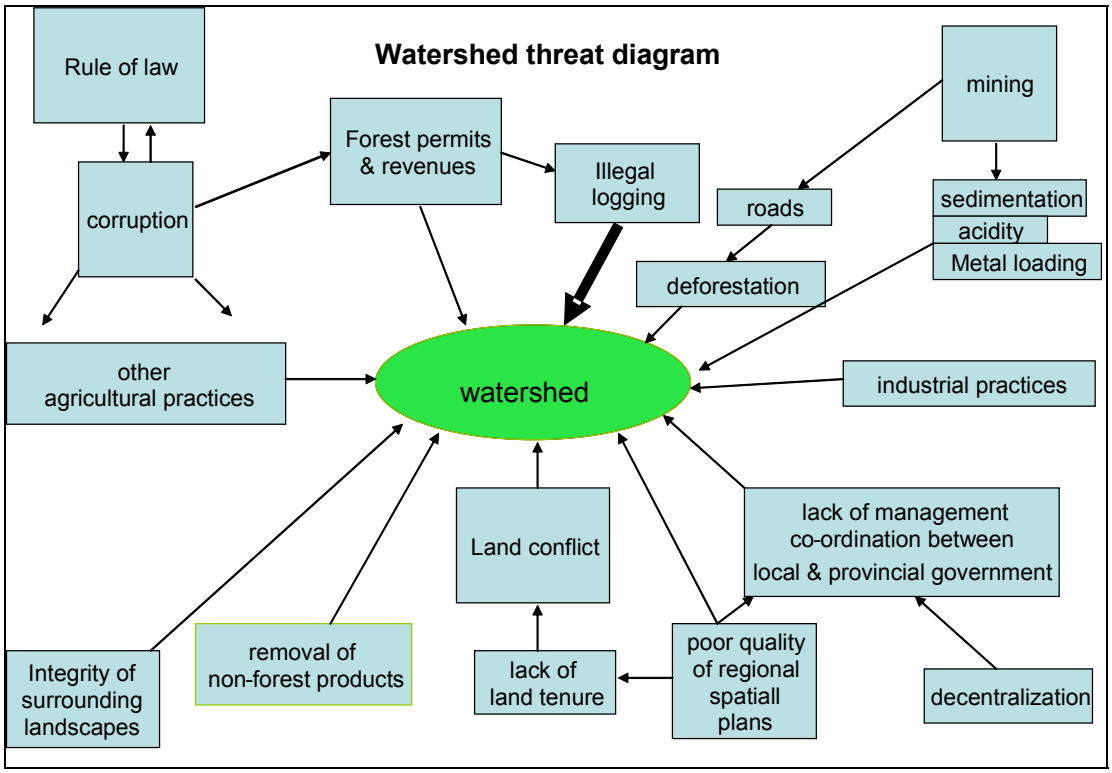

Figure 3. Major threats to watershed biodiversity and other natural resource values.

Other threats (Figure 3) will be recognized in the course of the Project. However, it is probable that type and intensity of threats will differ considerably between and within ESP priority watersheds.

4.2.9. CONDUCT STAKEHOLDER THREAT SOURCE/CAUSE ANALYSIS

This analysis was conducted with each of the serious (top six say) threats. This is to determine the ultimate and proximate cause of serious threats to allow selections of the most tactical solutions to be developed to mitigate or eliminate sources of threats.

4.2.10. CONDUCT A SITUATION OR FEASIBILITY ANALYSIS

This analysis determined the feasibility of implementing solutions identified as being required to mitigate or eliminate source of threats. Information gained in Section 4.1.1 above will be important in this analysis. It is possible that the favored solution suggested to abate threats is impractical because of cost, lack of community support, or inability to deal with the ultimate threat, such that the threat repeatedly appears despite the management intervention.

4.2.11. PREPARATION OF THE MANAGEMENT ACTION PLAN

The feasible solutions identified to abate threats to each conservation target will, in concert, form the Management Action Plan. For example, if their were two feasible solution identified to abate the threats to each of six conservation targets then there would be 12

recommended conservation actions that would require development into plans. These plans would need to accord to the strictures of adaptive management procedures. Namely, a baseline situation would need to be established against which the conservation actions can be judged, with clear outputs defined, and milestones established against which monitoring and evaluation of action plan progress can be assessed. Actions that abate threats to more than one conservation targets would be given priority.

Development of these action plans would be developed by a skilled conservation management specialist working with a small core team of stakeholders. These plans would then be framed as an Action Plan document and presented to the Stakeholders for review, modification and acceptance.

4.2.12. PUBLIC AWARENESS CAMPAIGNS TO SUPPORT MANAGEMENT PLANS.

The Management Plans for watersheds highlight important issues, threats and solutions to abate threats to watershed natural resource and biological values. As such, this information forms prime material to develop outreach and education programs for communities living in and around watersheds. There is good communication and a close synergy between both the ESP Watershed Management team and the conservation education team.

The water management forums will be involved with selection of educational material and will be consulted regarding the biological information that is used in these campaigns.

4.2.13. ESP/SOW REQUIREMENTS FOR MANAGEMENT PLAN IMPLEMENTATION

- Require local governments to demonstrate leadership and commitment by providing adequate technical and financial resources to facilitate the implementation of watershed management plans.
- Establish clear annual action plans and budgets based on the sustainable financing mechanisms as well as through local government support (thus effectively tapping into the government budget calendar).
- Assist upper-watershed communities to develop income generation activities that clearly support protection and rehabilitation of each watershed's environmental services. This can include reforestation, agro-forestry and agricultural development. It might also include village infrastructure support for clean water.
- Assist local governments and communities to prepare agro-forestry and reforestation proposals for funding from the National Reforestation Fund.
- Promote participatory monitoring and evaluation of management plan implementation, as reflected in a range of ecological, social and economic indicators. This might include water flow and quality; enhanced income of upper-watershed farmers; and enhanced delivery of public services in upper-watershed villages.
- Provide grants to NGOs and non-governmental institutions, such as Sea Partnership universities, for community watershed awareness building, participation, and outreach, biodiversity conservation, and income generation activities.

4.2.14. OVERALL WATERSHED MANAGEMENT ACTION PLANS

As stated above, watershed management plans should be a disaggregated set of management plans developed at both the level of Sub Watershed and Sub Sub Watersheds and for the overall watershed. Common solutions to abate threats arising from these 'Sub Watershed plans', which will be mainly aimed at mitigating proximate threats to conservation objectives, will be drawn out and given priority for an entire watershed. A management plan for each watershed will also be developed from a group of stakeholders formed from senior management and policy experts. This 'watershed plan' would focus more on solutions to abate ultimate threats to watersheds, such as government policy, legal frameworks etc.

Integrated management of watershed biological values and important natural resources will be achieved in the short –term by mitigating threats to conservation targets at the village level by collaborative local management guided by '*Sub-watershed forums'*, comprising mostly of stakeholders who formed the 'Sub-watershed plans'. Common conservation solutions that emerge from these '*Sub-watershed forums'* will be elevated for priority actions. Similarly, strategic conservation solutions to deal with source of threats, or ultimate threats, would be managed by an umbrella '*executive forum'* comprising stakeholders who formed the 'Overall Watershed plans' with additional representatives from the '*Sub-watershed* forums'.

4.2.15. ORGANIZATIONAL STRUCTURE AND FUNCTION OF WATERSHED FORUMS

It is expected that during the course of ESP, the executive forums –some of which exist in part- would provide the overview for sustainable long-term management of watersheds, based on consideration of both the Sub Watershed plans and overall Watershed plans. It is anticipated that ESP would have a purposeful role in the effective

operation of the *executive forums*, by assisting with the development of their mission, operational processes, including development of a secretariat and structures (to include technical advisory, monitoring & evaluations and fund raising which incorporates a Trust Fund, see section 4.2.17), collaboration with other agencies and organizations. If there can be agreement that the Provincial Governments will, before the completion of ESP, elevate the status of the *executive forums* to a watershed council or management board funded by government, then ESP may also assist with short-term operational funds to assist with the work of these *executive forums*. This could initially take the form of directed small grants for the operation of the forum Director and secretariat and for a finance specialist to explore trust fund development, including those for

PES or other rolling funds to provide a long-term source of operational funds, additional to those from the government.

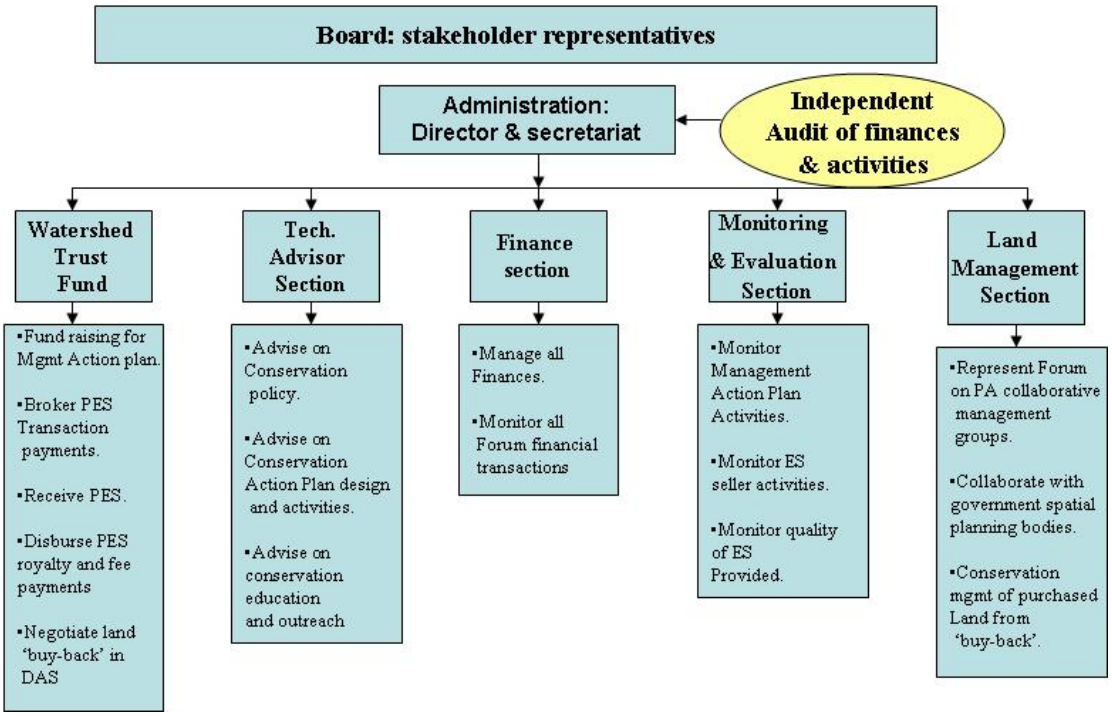

Figure 4. A proposed structure for the Executive Watershed Forum or Council. The Board would have key stakeholders represented, including from the Sub Watershed Forums.

4.2.16. ESP/SOW REQUIREMENTS FOR SCALING UP AND ACHIEVING NATIONAL-LEVEL IMPACT

- Provide technical assistance and coordinate with other donor-funded projects to assist the GOI in the development of the social forestry implementation regulations for the Basic Forestry Law of 2000.
- Assist local governments to implement social forestry programs and to clarify and resolve land tenure and access issues in their districts, ensuring farmers/villagers the opportunity to invest time and resources in 'best watershed management practices'.
- Assist local governments to launch land title – ship initiatives for local communities and small-hold farmers to enable them to obtain access to credit by providing collateral for longer term investments.
- Support farmer-to-farmer or village-to-village communication networks.
- Conduct environmental communication activities to raise awareness about watershed management and promote adoption of water resources management best practices

4.2.17. MONITORING & EVALUATION (M & E)

The ESP /SOW has a requirement to practice adaptive management principals for ESP conservation activities and interventions. In short, this requires the individual establishment of a baseline of information against which each major ESP activities can be monitored, along with clear indicators against which the success of these activities can be evaluated.

USAID/ARD (2005) indicates the general nature of such indicators of success, and the rigor expected in their practice.

The ESP Performance Monitoring Plan (PMP) has four outcomes that must be monitored as indictors of watershed management. These are:

1. The formation of adequate polices at the local level to recognize the tenure and/or access rights of communities to manage their forests and watershed areas, and implement transparent and participatory district level management of forests, thus reducing conflict and illegal logging.
2. In each High Priority Province, improvement of watershed function in areas supplying water to urban centers and PDAMs as measured by a 50% increase in rehabilitated land (total area of degraded land where trees, commercial or non-commercial are planted).
3. In each High Priority Province, area of forest with high biodiversity conservation value under improved local management increases by 50%.
4. In Aceh, improvement in watershed function with additional focus on the coastal margin directly impacted by the Tsunami, as measured by implementation of at least 15 targeted community-based land rehabilitation activities.

Formal work-plans, with timelines for milestones and measurable outputs will be developed for each of the above functional grouping of activities. Some of these activities will be long-term and will continue long after the ESP is completed. It is important that the watershed forums, both those in existence, for example, BPDAS and their associated forums (e.g., FKDAS, PPTA) and newly established forums, participate in the establishment of an independent monitoring and evaluation process, preferably engaging an existing competent NGO/university – with perhaps a grouping of forums contracting the same NGO/university-to carry out these assessments. Consideration needs to be given to assisting these forums, through funding and or provision of secretariat staff to undertake this role.

In addition to the above ESP global M&E requirements, other monitoring will be carried out to ensure that adaptive management practices are in place for all ESP conservation interventions. These include for the following activities:

HCV Areas selected

Brooks et al. (2004) indicate the preference to use some direct indicators of biological diversity. A rapid assessment of bird species diversity will be carried out in at least one watershed to compare bird and dung beetle species diversity in selected HCV focus areas with their diversity in areas considered to have relatively low conservation values. This survey will be done in conjunction with that required as baseline studies for section 6.2.3 below (prior to implementation of ESP conservation activities).

Mitigation of Threats to Conservation Objectives (targets)

Activities to mitigate threats to conservation targets should be detailed in both management action plans and work plans. ESP will assist both Sub –watershed stakeholders and protected area staff develop adaptive actionable management plans.

Management/work plans for HCV areas outside PAs will be developed with the appropriate level government agency operating at the scale of the intervention. Usually this will be at the scale of a Sub DAS and will involve one or more *kabupaten* and *kecamatan*. An example may be a conservation target for cleaner water in streams in 15 *desa* in Cianjur. The baseline may be established by levels of several water particulates or chemicals perceived as important, as

a baseline against which monitoring proceeds- with clear levels of pollutants proposed to indicate a successful intervention. Specific equipment will be required for such monitoring. This will include measuring flow rates, Fe and Manganese levels, PH, conductivity, hardness, and PSS (sedimentation) (Pak Asep/Sabdo pers. comm.). On the other hand, the baseline information may be obtained by a simple household survey before implementation of activities to ask a sample of people in each *desa* to rank water quality into several categories. This would be repeated at intervals through the course of the intervention activities. An indicator of success could be set, for example, at 75% of respondents recording that water quality was raised at least one category during the intervention.

The USAID required indicator of success for rehabilitation of land, namely, the percentage of degraded land planted with trees is at the overall ESP level. A number of other ESP activities will require finer levels of M &E and different indicators of success for adaptive management – particularly if the management plan developed through participative involvement of stakeholders requires conservation solutions off degraded land that do not involve planting trees.

An example might be to assist a Great Forest Park (*Tahura*) identify conservation management zones through a process of habitat mapping that allows identification of high conservation value zones, wilderness zones, limited visitor zones, and use zones. The Baseline information may be an absence of a conservation management zone map. Milestones for monitoring could be a map of habitat types and descriptions of a topical classification of zonation. Evaluation of an indicator of success could simply be the completion of a draft conservation management zonation that was acceptable, in principle, to Park management. An increase of 50% in area of forest with high HCV local management, as indicated in the ESP/PMP, is too broad as a criterion of success to evaluate this activity.

Management plans originating from stakeholders at all levels may select rehabilitation solutions that do not include planting of trees. The current draft of the ESP/PMP anticipates this by referring to Ecologically–based & Sustainable Agriculture. It is possible also that ecologically based solutions, such as use of Vitiger grass on contoured mounds, or planting of bamboo on upper slopes of river banks, could proceed in conjunction with planting trees.

Different indicators of success may need to be selected for a single intervention. For example, planting bamboo along streams may be a multipurpose ecologically based intervention. It may be planted to lower water temperatures to enable specific aquatic species (fishes) to breed and survive; to reduce stream particulate loads; to allow habitat for local animals to breed and rest- such as warblers, white eyes and shrikes- and to provide movement corridors for specific ecologically coarse-grained animals. In this case, indicators of success against a pre-intervention baseline may, for example, be a decrease in maximum water temperature by two degree centigrade, a 10% decrease on PSS; a 20% increase in bird and animal species recorded in a specified area of embankment.

Their may be a number of ESP interventions dealing with this area that cannot be directly assessed by the PMP indicator dealing with the outcome for "formation of adequate policies at the local level, namely ….number of new policies recognizing land tenure and access rights….For example, ESP interventions to upgrade the quality of spatial planning products to inculcate more biological conservation elements, through-a scoping study-assistance to government at various levels with GIS infrastructure-spatial planning training and preparation of spatial planning protocols- may not lead to new *policies* relating to land tenure.

Indicators of the success of such activities pre ESP and at the closure of ESP could be: a 20% reduction in conflicts between the spatial planning scenarios in a set of government agencies who conduct such planning; a 60% increase in the ranking of biological conservation input into spatial plans and/or; a 40 % decrease in the extent to which spatial plans are contracted out to experts from outside the planning areas.

4.2.18. ALTERNATIVE FINANCE MECHANISM (PES) FOR CONSERVATION ACTIVITIES IN UPPER WATERSHEDS

Introduction

As noted above (section 4.2.12), ESP is interested to assist upper-watershed communities develop income generation activities that clearly support protection and rehabilitation of a watershed's environmental services.

One such financing model that is being explored is Payment for Environmental Services (PES). This model is detailed in Winrock International (2004). Winrock state that the" increased demand for clean and abundant water, growing recognition of the failure of current watershed management programs, ongoing decentralization and an increasing focus on poverty reduction in Asia, support the development of a new paradigm for watershed management". They consider that PES has the potential to serve this new paradigm if it can be shown to result in effective watershed management.

The PES model

Winrock International (2004) defines the five elements of the PES model as follows:

i. Clearly defined royalty and fee assessments.
ii. Earmarked funds with transparent process and procedures for disbursements.
iii. Multistakeholder committees on boards with strong representation and voice by environmental stewards.
iv. Locally determined priorities and mechanisms.
v. Participatory planning and performance monitoring.

Box 7. Payment for Environmental Services (PES)

"In conservation and rural development circles, many look to PES as a source of just reward for poor rural dwellers who take care of the environment and continuously 'produce' environmental services- until now for free. However, from an efficiency point of view, only those who constitute a credible threat to environmental service provision should be paid….the 'ideal environmental seller' is, if not outright environmental nasty, then at least has the potential to become so".

This 'fairness issue' is a "question that PES schemes must somehow relate to, balancing here and now efficiency goals with fairness considerations that are vital for long-run viability and for avoiding perverse incentives" (Wunder 2005).

However, PES has been expanded in its vision to include a range of environmental services in addition to water. Wunder (2005) notes that four broad groupings of environmental services are usually discussed for PES. These are:

- Carbon sequestration and storage (e.g., usually planting and maintaining additional trees).
- Biodiversity protection (e.g., donors pay local villagers for conservation set asides, such as biological corridors).

- Watershed protection (e.g., downstream water users paying upstream farmers to adopt land practices that favor conservation of land water or biological diversity).
- Landscape beauty (e.g., tourism operator paying a local community not to hunt in a forest being used by wildlife tourists).

The PES model, however, is still in its infancy in tropical countries (where it is most advanced in Latin America), although in developed countries it has become somewhat developed as an effective model. Thus it was noted in the 'National Workshop: Payments and Rewards for Environmental Services, Jakarta 14-15 February 2005' that PES "in Indonesia needs further development in order to support sustainable development and reduce poverty". Participants in that Workshop recommended that a number of things need to be developed to support PES in Indonesia including: developing a better understanding of the role of regulation for PES at government level, legislative and society; working with existing laws to avoid overlapping rules; and building more flexible regulations at the national and local levels.

Carbon Sequestration

It is also clear that to date early projections of large amounts of funding for Carbon Sequestration have not eventuated (Winrock International 2004). However, PES for Carbon Sequestration (CS) has moved somewhat in Indonesia over the last five years. On 22 June 2004 the House of Representatives of GoI approved a bill to ratify the Kyoto protocol (The Jakarta Post, 24 June 2004). In conjunction with some international and national institutions, they have explored possible national strategies to control greenhouse gas emissions in all sectors and have formed a Designated National Authority (DNA) as the primary requirement within the national strategy. According to Suyanto et al. (2005), the DNA will design the activities that relate to project development and capacity building and to increase public awareness of CS.

A proposed market mechanism to develop carbon credits in Indonesia is being carried out in a pilot project for the national strategy "Development of Reward Mechanisms for Environmental Services provided by Upland Poor at Singkarak Watershed". In addition, research and studies have been carried out to support Indonesia's readiness to participate in the carbon market (Suyanto et al. 2005: Appendix 3).

Under the clean development mechanism (CDM) of the Kyoto Protocol (COP3 Kyoto, Japan, 1997), *afforestation* and *reforestation* are defined as follows:

- Afforestation involves converting land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human induced promotion of natural seed sources.
- Reforestation involves converting land that was once forested, but did not contain forest on 31 December 1989 to forested land.

These two definitions of Afforestation and Reforestation restrict the use of CS in some ESP HPP watersheds. Despite this and the fact that payments for CS usually require complex and lengthy negotiations, the possibility of CS is considered, particularly in conjunction with PES for water values protection.

Deschamps (2004) reviewed the FORMACS Carbon Sequestration project implemented by CARE Indonesia and CARE Canada at Nunakan, East Kalimantan. He concluded that this was a potentially excellent Indonesian CS model that will be examined by ESP. He noted that

community engagement is a long and sometimes trying process, but is critical to project success.

Biodiversity protection

Suyanto et al. (2005), report that there is only one clear case of PES for biodiversity protection in Indonesia. This is at Meru Betiri National Park where a local community obtained a land lease to manage the buffer zone around the National Park. As part of this agreement they are obliged to plant local medicinal trees. This work is coordinated by an Indonesian NGO (Latin) and the Bogor Agricultural University (IPB).

Watershed protection

Suyanto et al. (2005), report on two clear cases in Indonesia where PES is being used for watershed protection. The first is an annual water fee by PT Inalum to the north Sumatra District Government to support efforts to protect the watershed functions of Lake Toba. The second is a project coordinated by ICRAF, in collaboration with a local NGO and the local government of Lampung, Sumatra, to support leasing of state owned land to the local community for protecting watershed function.

Landscape beauty protection

In Indonesia, PES for protection of landscape beauty appears to be the most advanced of all four environmental service markets. Suyanto et al. (2005) document five cases where there are currently working models of payments for landscape beauty (Komodo National Park, Gunung Halimun National Park, Togean Island and the Gili island ecotourism developments). The government issues licenses for environmental services for up to 10 years and up to 1000ha areas. The mechanism to pay for the services is entrance fees and user fees.

ESP considerations

Payments for protection of biodiversity and protection of landscape beauty in the ESP high priority watersheds need careful considerations. Environmental reward payments to a minority of individuals in a community are considered to have several downsides, most notably the potential for them to become a perverse incentive (see Box 7). This is because relatively few members of a community generally hunt, remove timber and non-forest products and encroach high conservation value areas and beauteous spots. Further, those that do so may find, for several reasons, extreme difficulty in stopping their activities. First, those abusing the environment are merely trying to make a living (Dudley 2005); they frequently are the poorest members of a community and own no land. As such they may need assistance to alter their resource use pattern. Secondly, they are often a type of 'indentured labor', in that they frequently work for businessmen to whom they have a financial debt which can only be paid off by continuing these encroachment activates on behalf of these businessmen. So, in some cases, the actual environmental threat is from outside business men. The use of PES to such businessmen would be inappropriate.

Perhaps the principal problem with PES is that it can end up being an extension of conventional policies that exclude rural people from the resources that they need for their livelihoods. As noted by Hutton et al. (2005), in the absence of both sustainable funding and organizational change at community level, " direct payment schemes may not only be short - term, but may result in the situation being worse at termination than at inception".

Further, the difficulty of selecting a few members of a wider community for PES would be extremely difficult in an Indonesian context because of the issues of "fairness" (see Box 7), and where issues of social jealousy concerning unfair or perceived unfair situations are common and rancorous between and within communities.

If the majority of community members were directly involved in the process of protecting an environmental service, such as water supply and water quality, or as in the case of the buffer zone of Meru Betiri National Park, then the situation becomes relatively easier and issues of 'fairness' "perverse incentives" or 'indentured labor' are less relevant.

In the most common cases of PES in Indonesia, namely protecting landscape beauty, the seller of the environmental service is a national park and the protection of the ES is bought about by guardianship not stewardship. This transaction is elevated from a simple entry fee payment to a PES because of the involvement by multistakeholder committees to oversee entry fee collections, and the use to which these fees are placed - and also to promote the ES. However, their emphasis is on enforcement (Suyanto et al. 2005), rather than the more favored stewardship role for the seller of the ES. The preference for stewardship is that it tends to promote a conservation culture in local communities that is more likely to have a sustained long – term impact on the environmental service. On the other hand, the role of a guardian often alienates local communities. Recent history in Indonesia indicates that changes in political winds and increased poverty can make it impossible to guard environmental service values if the community has no stewardship role and is not empathetic to the purpose of the Park.

In summary, considering the above, all these ES are applicable in ESP high priority watersheds, but that watershed protection probably has the best chance of being developed as a successful long-term PES model.

Box 8. Uncontrolled Urban Development Threatens Catchment areas in West Java

The Bogor Regency has begun to demolish illegally built villas in the Tamansari District.

"According to the Bogor Public Works Agency, around 4000 villas in the Regency were built without permits. Non Government Organizations have blamed the number of villas in the Puncak mountain resort for environmental damage. The intensity of development around Bogor, Puncak and Cianjur-part of West Java- is consistently blamed for Jakarta's annual floods.

The West Java Governor, Danny Setiawan, pointed out that it was the Jakarta elite who caused the catastrophe. They bought the land and built villas or paid local farmers to cultivate fruit and vegetables for the consumption of Jakarta residents, reducing water catchments. The high influx of visitors, uncontrolled development and poor law enforcement, are all culprits with regard to environmental damage he said"

In *The Jakarta Post;* 16 May 2006, by Theresia Sufa

An initial potential ESP activity in Cianjur high priority watershed

ESP is working to overcome some of the obvious difficulties to implement PES or a modification of PES in watershed protection. These are:

- *Identification of a model HPP catchment area*. The Cianjur catchment area is an ideal location because it is so important as a supplier of water downstream to several large reservoirs and ultimately to DKI Jakarta. The situation in

  Cianjur is that water sources (rivers, springs and wells) are suffering very large reductions in their water deficits in recent years. Some of these are in fact becoming dry. Exacerbating this effect in Jakarta is the underground sea water that is intruding into central, Jakarta as far inland as MONAS, as a consequence of Jakarta residents and factories pumping water from their

unconfined underground aquifer. There exists a situation where in the near future, water resources in Jakarta will become so scarce that three things can be predicted. First, there will be a realistic fee placed on that water; secondly, conservation methods on water consumption will be implemented; and thirdly, Jakarta buyers of water will pressure better conservation and management of their water sources, including in the Cianjur Watershed.

- *Identification of sellers of watershed protection services*
  This has several aspects. First, ESP is assessing the spatial scale and intensity of the various activities and threats and 'players' who most degrade watershed water values. Secondly, ESP is examining the realistic probability of abating these threats and which of the environmental 'players' most contribute to these threats. And thirdly, ESP is examining the most sensitive ways of rewarding those that most contribute to these threats, while not rewarding villagers - sometimes of the same community- who are environmentally responsible (or at least cause less damage to the watershed), without invoking perverse incentives.

  In the Cianjur Watershed, the situation is far from simplistic. In fact, we argue that the greatest threat to watershed values in Cianjur is not the small farmers, particularly if they utilize modern approaches to contouring and managing their land in an ecologically sensitive way. But rather the threat is from unregulated growth in housing and other tourist infrastructure developments that occur and are planned on top of crucial watersheds and underground aquifers (*resapan*) (see Box 8). A great deal of land in Cianjur has been privately purchased for speculation; the future sale and conversion of this land poses a substantial further nascent threat to the watershed. To protect watershed values, local government needs to invoke limits on the future development of the population, housing and other tourist developments in Cianjur and demolish houses and estates built without permits on important catchment areas. Furthermore, speculative land (*tanah tidur*) needs to be re-purchased and rehabilitated by planting of trees and other ecologically sensitive activities.

  In other words the most important seller of watershed protection in Cianjur is the local government. It can put limits on growth of housing, tourist infrastructure and land use. However, to encourage the Cianjur Regency to behave in an environmentally responsible way to protect key watersheds, there would need to be a PES instituted to recompense them for the loss of certain taxation and other revenues.

  Other important sellers of protection of water services in Cianjur are the:
  - National Park (TNGP), because they protect the extreme upper catchment areas and their land values by conservation of natural vegetation and abatement of inimical environmental activities by environmental vandals. Many of these areas are mapped as *zona rehabilitasi* and are in need of restoration.
  - Land speculators, because a great deal of land in the area is owned by absentee landlords who are biding their time to sell this land as tourism and property investments.
  - Farmers, because they sometimes use water in an uneconomic way

and apply poor agricultural practices (poor contours, overuse of water) which do not maximize the amount of water that can recharge the underground aquifers and/or minimize sedimentation and fertilizer run off into rivers and streams.

- PDAMS, because they are frequently given authority, by local government regulations or PERDA, to manage the ecology of land immediately around natural springs and in the aquifer (*resapan*) that feeds springs. However, many of these spring management zones are too small or are degraded and badly in need of restoration. An example is at Desa Cirumput, Cianjur. In recent years the water deficit at the Cirumput Spring has fallen from 600 to 156 liters per second. Further the ecological management zone around this spring is only 15 m. A recent assessment of the Spring at the request of ESP (FORKAMI 2006), indicates that the ecological management zones required to conserve the ecological system and restore the Spring function is: 10-20 m immediately around the Spring (zone 1); Zone 2 is 780-800 m and zone 3, is 7.4 km. PES to PDAMS could be to facilitate three protection functions. First to better define the extent of the ecological buffer zones required to conserve springs. Secondly, achieve the necessary PERDA to support these zones. And thirdly, to implement conservation actions to rehabilitate the ecology of the spring system
- Local Communities because they contribute to the pollution of water quality by waste and refuse disposal and disposal of household products. They also farm to the edge of rivers and streams, despite the legal width of the riparian buffer zone being placed at 100m on either side of a first order river and 50m on either side of a second order stream. This results in erosion and increased sedimentation into water supplies down stream.
- Industry, because first they impact water debits by excessive draw down of wells and streams (particularly the 'cut-flower' industry that requires maximal water supplies during the hottest time of the years, most of which evaporates and does not recharge the underground aquifers). And secondly, because they discharge pollutants into water (most notably sand soil, and rock mining or *galian C*).

- *A transparent process for disbursing royalty and fee payments*
  ESP has considered a number of options for dispersing user payments to targeted sellers of watershed services, including Trust Funds. Such Trusts have been successful in managing such payments elsewhere. What is abundantly clear is that these funds should be used for environmental protection and not to alleviate poverty. Wunder (2005) considers that while poverty alleviation is an important side effect of PES, if it becomes the primary objective it will jeopardize the basic PES functionality. Whether it is Trusts or other dispersal mechanisms that eventuate, these payments should be made through an independent authority, with an independently constituted board of distinguished Indonesian citizens, and which has a very public audit process. This authority would issue PES to the targeted sellers and the effect of these payments would be monitored by a further independent group, preferable of environmental NGO. The entire process

would be monitored by the Executive Watershed Forums (see Section 4.2.3.) which would produce an annual public report.

In the case of the Cianjur Watershed, a model is being prepared (Figure 5) whereby PES payments from the buyers would be made to a Watershed Trust Fund, located within the Executive Watershed Forum or Council. This Trust would make certain payments to the Cianjur Kabupaten that compensated them for lost taxes etc for a period of time, say 10 years. The nature and extent of these payments will be annually assessed by a contracted study and agreed upon by the Trust and the Kabupaten. In return, the Kabupaten would be monitored to ensure that they had reformed their spatial planning process and enforcement of plans to better conserve watersheds (and remove the possibility of land speculation above key catchments). Further, the Trust would also have a major role in purchasing land, in that it would buy back land from absentee tenants. Land acquired in such a way would be administered by the Management Board of the Executive Watershed Forum who would ensure that this land was sensitively managed for watershed functions. It would contract out the implementation of any conservation activities to independent contractors. It would not become a conservation management authority as such but would strive to place the management of such land in the hands of NGOs, a formal group of which would form an advisory council to the Trust. These activities might include:

- planting of trees and other vegetation, including bamboo and vetiger grass;
- improved contouring of agricultural land;
- improved spatial planning;
- management of springs and rivers;
- environmental education; and most importantly
- monitoring of the results of PES, to demonstrate to the down-stream residents that their PES in fact improves both water quality and quantity. Lack of such monitoring could ultimately bring about the downfall of such programs if it is not clear that their payments are cost effective (Winrock International 2004).

Payment would be made to the other key water service sellers or providers, after assessment of the reward payment, through the most representative and transparent village organization.

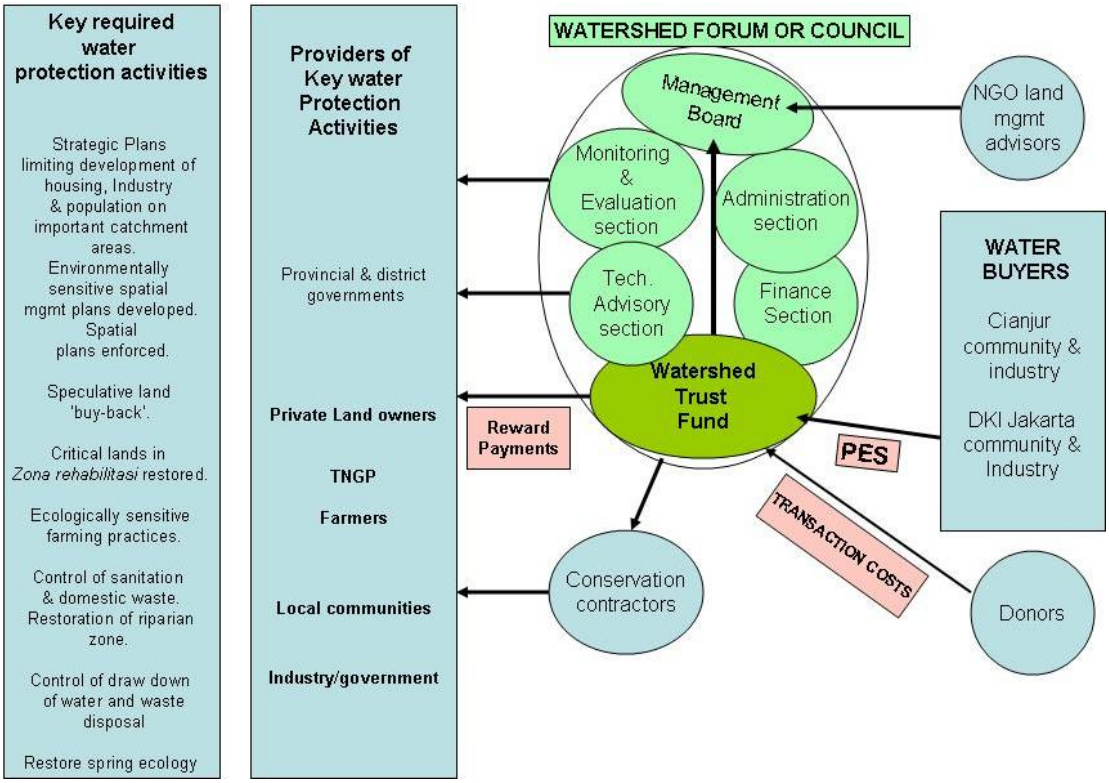

Figure 5. Preliminary model for PES for water services in Cianjur Watershed, West Java

5. ESP POTENTIAL ACTIVITIES IN SPECIFIC PROTECTED AREAS

The focus of ESP activities in their selected HPP is in watersheds selected using criteria described in Chapter 2, above; usually three ESP watersheds have been selected in each HPP. However, in some HPPs a single watershed has been selected which has a number of Sub-watersheds. In the case of Central Java, to this date only a single watershed has been selected, but it will be added to as that program develops in subsequent years.

5.1. JAVA

5.1.1. WEST JAVA

There are six ESP Priority watersheds (DAS) in West Java. These are i) Cikundul Sub DAS and ii) Cilaku Sub DAS in the Citarum DAS (Kec. Cianjur); iii) Cisangkuy Sub DAS and iv) Cikapundung Sub DAS also in the Citarum DAS (Kab. Bandung); v) Ciasum DAS and vi) Cipunegara DAS (Kab. Subang).

Conservation PAs in these ESP priority watersheds are: Taman Nasional Gede Pangrango & Kebun Raya Cibodas (Citarum DAS); Burangrang Cagar Alam (Cilamaya and Ciliwung DASes); Tangkuban Perahu Cagar Alam/ Taman Wisata Alam (Ciasem and Cipunegara DASes), Talaga Warna Cagar Alam (Ciliwung DAS), Ir. H. Juanda Grand Forest Park (Ciliwung DAS).

Note: Sub DAS Cisangkuy dan Cikapundung are candidate priority DAS

<u>Taman Nasional Gede Pangrango (including Kebun Raya Cibodas that is managed by LIPI)</u>

- It has an area of 21,975ha. It was one of the first national parks in Indonesia. It was declared by the Minister of Agriculture and was designated in 1980.
- It is in Kab. Bogor, Cianjur and Sukabumi.
- It ranges in altitude from 1,000 to 3,000m a.s.l. and receives an average rainfall of 3,600mm per year.

Natural resource and social values

- Is important to biodiversity in Java because it represents montane, montane and alpine ecosystems and lakes, marshes and savanna.
- Major water catchment area for three DAS, including the supply to Jakarta.
- It has a number of endangered and protected species including the Javan Gibbon (*Hylobates moloch*), Javan Leaf-monkey (*Presbytis c. comata*), Ebony Leaf-monkey (*Trachypithecus a. auratus*), Panther (*Panthera pardus*), Leopard cat (*Prionalurus bengalensis javanensis*), Barking Deer (*Muntiacus muntjak*), Asian Wild Dog (*Cuon alpinus javanicus*), Lesser Malay Mouse-deer (*Tragulus j.*

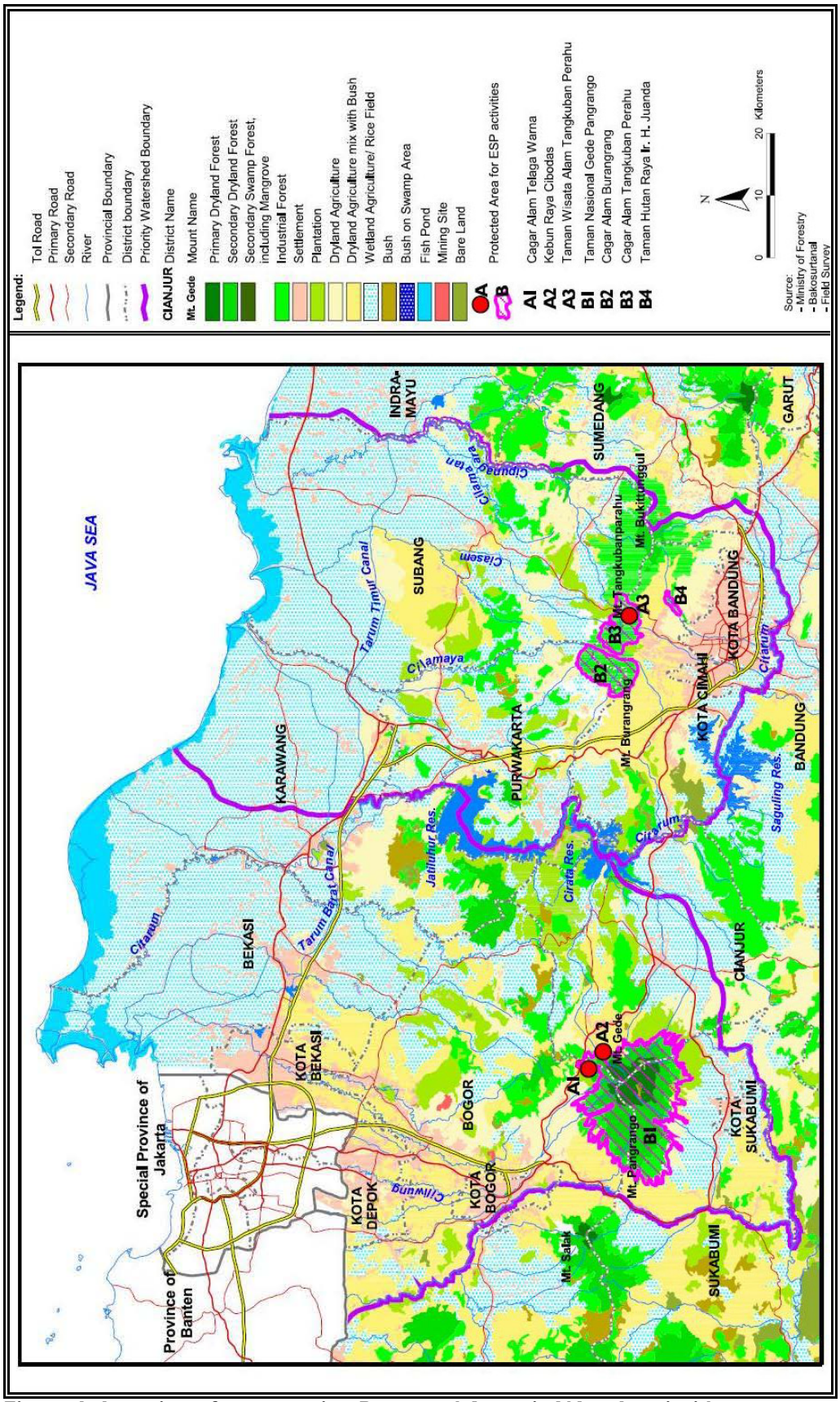

Figure 6. Location of conservation Protected Areas in West Java inside, or connected by forest to, ESP priority watersheds

javanicus), Southeast Asian Porcupine (*Hystrix b. brachyura*), Stink Badger (*Mydaus javanensis*) and Yellow-throated Marten (*Martes flavigula*).
- 251 or over half the 450 species of bird recorded in Java inhabit this Park. These include the endangered Javanese Hawk Eagle (*Spizaetus bartelsi*) and owl (*Otus angelinae*).
- It was declared a Biosphere Reserve in 1997.
- It is surrounded by many superstitions and to some villagers is a sacred place, particularly caves around Gunung Gede.
- It has many scenic attractions including Biru Lake, Cibeureum Waterfalls, thermal springs, Kandang Batu and Kandang Badak areas for watching wildlife (Sriyanto et al. eds 2003).

Challenges and Threats to these values
- Illegal logging.
- Extraction of non-forest products.
- Encroachment of village gardens.
- Hunting.
- Tourism and trekking.

Current conservation activities
- PHKA management unit (UPT) that is well staffed.
- An existing management plan with conservation management zones, including *zona rehabilitasi.*
- Research studies on the wildlife.

Possible ESP activities Facilitate collaborative linkages with surrounding stakeholders.
- Facilitate tree planting in the *zona rehabilitasi*.
- Provide requested conservation planning expertise.
- Develop a conservation pride program.
- Develop private sector partnership to support conservation.
- Explore alternative financing mechanisms for conservation activities through payments for environmental services.

<u>Gunung Burangrang Cagar Alam</u>

- It has an area of 2.700,00 ha. It was declared by 479/Kpts/Um/8/79 and was designated on 2 August 1979.
- It is in Kab. Bandung.
- It is managed by the Bandung BKSDA.
- Its elevation ranges from 2,600m -3000m.

Natural resource and social values
- Type ecosystems for tropical mountain forest.
- With Gunung Tangkuban Perahu and Gunung BukitTunggul it forms the largest area of upper montane forest in the central northern part of West Java and is a crucial repository of the relictual representative mountain fauna and flora of that region.
- The Indonesian Yayasan YPAL states that in Panaruban are several important rivers for communities, including: Cikoneng, Cimuja, Cijulang and Ciasem.

The Cimuja and Ciasem have a water debit of 1,000to 3,000 liters per sec http://www.pikiran-rakyat.com/cetak/0404/30/0303.htm).

- Has populations of the endemic Chestnut-bellied Hill-partridge (*Arborophila javanica*) which also occurs in a number of other remaining fragmented mountain forests on Java (Nijman 2003).
- Has the following flora: Jamuju (*Podocarpus imbricate*), Puspa (*Schima walichii*), Pasang (*Quercus* sp.), Rasamala (*Altingia exelsa*), Saninten (*Castanea argentea*), Kihiur (*Niza javanica*) and several species of orchid, including Anggrek Bulan and Anggrek Japati.
- Has the following mammals: Macan Tutul or Panther (*Panthera pardus*), Babi Hutan or Pig (*Sus vitosus*), Owa (*Hylobates moloch*), Surili (*Presbytis aygula*), Lesser Malay Mouse Deer or Kancil (*Tragulus javanicus*), Barking Deer or Kijang (*Muntiacus muntjak*), Sero, Binturung, Ajag, Tando, Kucing Hutan or Leopard Cat (*Prionalurus bengalensis javanensis*), Bajing Terbang or Flying Squirrel, Sigung, Musang, Jelarang, Lutung or Slow Loris. And birds: Javanese Eagle or Elang Jawa (*Spizaetus bartlesi*), Buring Elang Ulang (*Spilornis cheela*) and Ayam Hutan (*Gallus gallus*).
- A symposium on eagles in Bandung in 2000 considered that the habitat in Gunung Burangrang and Gunung Tangkuban Perahu was one of the most important natural sites for Elang Jawa. IUCN considered that in 2003 there were only 81-108 Elang Jawa in Java and that it was critically endangered species. The Indonesian Yayasan YPAL says that in 2003 there were three pairs of Elang Jawa in the area of Gunung Burangrang and Gunung Tangkuban Perahu. The region also has other important threatened bird species such as: Elang Alap Cina, Elang Alap Nipon, Elang Brontok, Elang Hitam, Elang Perut Karat, Elang Ular Bido, Sikep Madu Asia (http://www.pikiran-rakyat.com/cetak/0404/30/0303.htm).

Challenges and Threats to these values

- Encroachment.
- Illegal logging.
- High density tourism and rubbish disposal.

Current conservation activities

- There is a formed management authority of the central Government (BKSDA UPT).
- PERHUTANI manages the tourism activities including the entrance fees.

Possible ESP activities

- Assist develop collaborative management plan.
- Explore ways to develop a forest corridor link it to Gunung Tangkuban Perahu to the east.
- Work to have management of the entrance fee payment system decentralized so that monies can be more directly used for conservation management in the PA.
- Assist with a conservation outreach campaign in surrounding villages.
- Assist develop a tourism management plan.

Gunung Tangkuban Perahu Cagar Alam (Bandung)

- It has an area of 1,290ha.
- It was declared by 528/Kpts/Um/9/74 and designated on 3 September 1974.
- It is in Kab. Bandung.
- Its elevation ranges from 2,600m -3000m.

Natural resource and social values

- Type ecosystems for tropical mountain forest.
- With Gunung Tangkuban Perahu and Gunung BukitTunggul it forms the largest area of upper montane forest in the central northern part of West Java and is a crucial repository of the relictual representative mountain fauna and flora of that region.
- Has the following flora: Jamuju (*Podocarpus imbricate*), Puspa (*Schima walichii*), Pasang (*Quercus* sp.), Rasamala (*Altingia exelsa*), Saninten (*Castanea argentea*), Kihiur (*Niza javanica*) and several species of orchid, including Anggrek Bulan and Anggrek Japati.
- Has the following mammals: Macan Tutul or Panther (*Panthera pardus*), Babi Hutan or Pig (*Sus vitosus*), Owa (*Hylobates moloch*), Surili (*Presbytis aygula*), Lesser Malay Mouse Deer or Kancil (*Tragulus javanicus*), Barking Deer or Kijang (*Muntiacus muntjak*), Sero, Binturung, Ajag, Tando, Kucing Hutan or Leopard Cat (*Prionalurus bengalensis javanensis*), Bajing Terbang or Flying Squirrel, Sigung, Musang, Jelarang, Lutung or Slow Loris. And birds: Javanese Eagle or Elang Jawa (*Spizaetus bartlesi*), Buring Elang Ulang (*Spilornis cheela*) and Ayam Hutan (*Gallus gallus*).
- A symposium on eagles in Bandung in 2000 considered that the habitat in Gunung Burangrang and Gunung Tangkuban Perahu was one of the most important natural sites for Elang Jawa. IUCN considered that in 2003 there were only 81-108 Elang Jawa in Java and that it was critically endangered species. The Indonesian Yayasan YPAL says that in 2003 there were three pairs of Elang Jawa in the area of Gunung Burangrang and Gunung Tangkuban Perahu. The region also has other important threatened bird species such as: Elang Alap Cina, Elang Alap Nipon, Elang Brontok, Elang Hitam, Elang Perut Karat, Elang Ular Bido, Sikep Madu Asia (http://www.pikiran-rakyat.com/cetak/0404/30/0303.htm).

Challenges and Threats to these values

- Encroachment.
- Illegal logging.
- High density tourism and rubbish disposal.

Current conservation activities

- There is a formed management authority of the central Government BKSDA UPT).
- PERHUTANI manages the tourism activities including the entrance fees.

Possible ESP activities

- Assist develop collaborative management plans and management processes.
- Work to have a forested corridor link to BukitTunggul to the east and Gunung Burangrang to the west.

- Work to have management of the entrance fee payment system decentralized so that monies can be more directly used for conservation management in the PA.
- Assist with a conservation outreach campaign in surrounding villages.
- Assist develop a tourism management plan.

Talaga Warna Cagar Alam (included because it is connected to forested areas in high priority)

- It has an area of 368ha.
- Declared by Surat Keputusan Mentei Pertanian No. 481/Kpts/Um /6/1981 and designated on 9 June 1981.
- In Desa Tugu, Kec. Cisarua, Kab. Dati II, Bogor. Altitude 1,400m. Average annual rainfall 3,380mm.

Natural resource and social values

- It is Tropical montane forest.
- Hutan is in reasonably good condition.
- Has the following flora: Rasamala (*Altangia excelsa*), Puspa (*Schima walichii*), Huru (Litsea sp), Hiur (*Custanopsis javanica*), Jamuju, Pasang (*Quercus* sp.). And fauna: Kancil (*Tragulus javanicus*), Surili (*Presbytis aygula*), Owa (*Hylobates moloch*), Menjangan , Kijang (*Muntiacus muntjak*)

Challenges and Threats to these values

- Hutan is in reasonably good condition.
- Hunting of birds
- Removal of fire wood.
- Removal of native flowers.
- Removal of boundary markers.
- Approximately 10 ha has been encroached upon by village kebun.

Current conservation activities

- unknown

Possible ESP activities

- Not scoped

Talaga Warna Cagar Alam

(included because it is connected to forested areas in high priority watershed)

- It has an area of 368ha.
- Declared by Surat Keputusan Mentei Pertanian No. 4881/Kpts/Um /6/1981 and designated on 9 June 1981.
- In Desa Tugu, Kec. Cisarua, Kab. Dati II, Bogor. Altitude 1,400m. Average annual rainfall 3,380mm.

Natural resource and social values

- It is Tropical montane forest.
- Hutan is in reasonably good condition.
- Has the following flora: Rasamala (*Altangia excelsa*), Puspa (*Schima walichii*),

Huru (Litsea sp), Hiur (Custanopsis javanica), Jamuju, Pasang (*Quercus* sp.). And fauna: Kancil (*Tragulus javanicus*), Surili (*Presbytis aygula*), Owa (*Hylobates moloch*), Menjangan , Kijang (*Muntiacus muntjak*)

Challenges and Threats to these values

- Hutan is in reasonably good condition.
- Hunting of birds
- Removal of fire wood.
- Removal of native flowers.
- Removal of boundary markers.
- Approximately 10 ha has been encroached upon by village kebun.

Current conservation activities

- unknown

Possible ESP activities

- Not yet scoped

5.1.2. CENTRAL JAVA

ESP Central Java will initially work in DAS Progo. However, the focused Sub-watersheds for ESP activities have not been sharply defined as of May 2006. The watersheds of Sumbing Mountain (Sub DAS Tangsi and Jumprits) and watersheds of Merapi Mountain (Sub DAS Krasak and Batang) are potential focal areas.

Conservation PAs in the Progo watershed comprise two recently declared national parks: Taman Nasional Gunung Merapi (DAS Progo/ Sub DAS Elo); Taman Nasional Gunung Merbabu (DAS Progo/Blonkeng Sub DAS); Plawangan Turgo Taman Wisata Alam (DAS Progo/Sub DAS Hilir); Gunung Gamping (DAS Progo/Sub DAS Hilir); and Gunung Batu Gamping Cagar Alam

(DAS Progo/ Sub DAS Hilir). Additionally, in the Sumbing Mountains near Desa Sambak (Sub DAS Tangsi) forests are protected and managed as a result of an MOU between PERHUTANI and the Sambak villagers.

<u>Taman Nasional Gunung Merapi</u>

- This Park is 6,410 ha and covers three kabupaten in Central Java (Magelang, Boyolali and Klaten) and Sleman in Jogjakarta. It was declared only on 4 May 2004 (*Keputusan Menteri Kehutanan* No. 134/Menhut II/2004).
- The Fakultas Kehutanan Universitas Gadjah Mada (UGM) carried out the studies that were the basis of recommendations to form the Park.
- The Park is one of the major sources of water required by kabupaten/kota Sleman, Yogyakarta, Klaten, Boyolali, and Magelang. Four rivers flow from Boyolali (Serang, Cemoro, Pepe and Gandul).

It also has a unique and dynamic ecosystem that results from a combination of its tropical mountain 'biosystem' which is influenced greatly by its

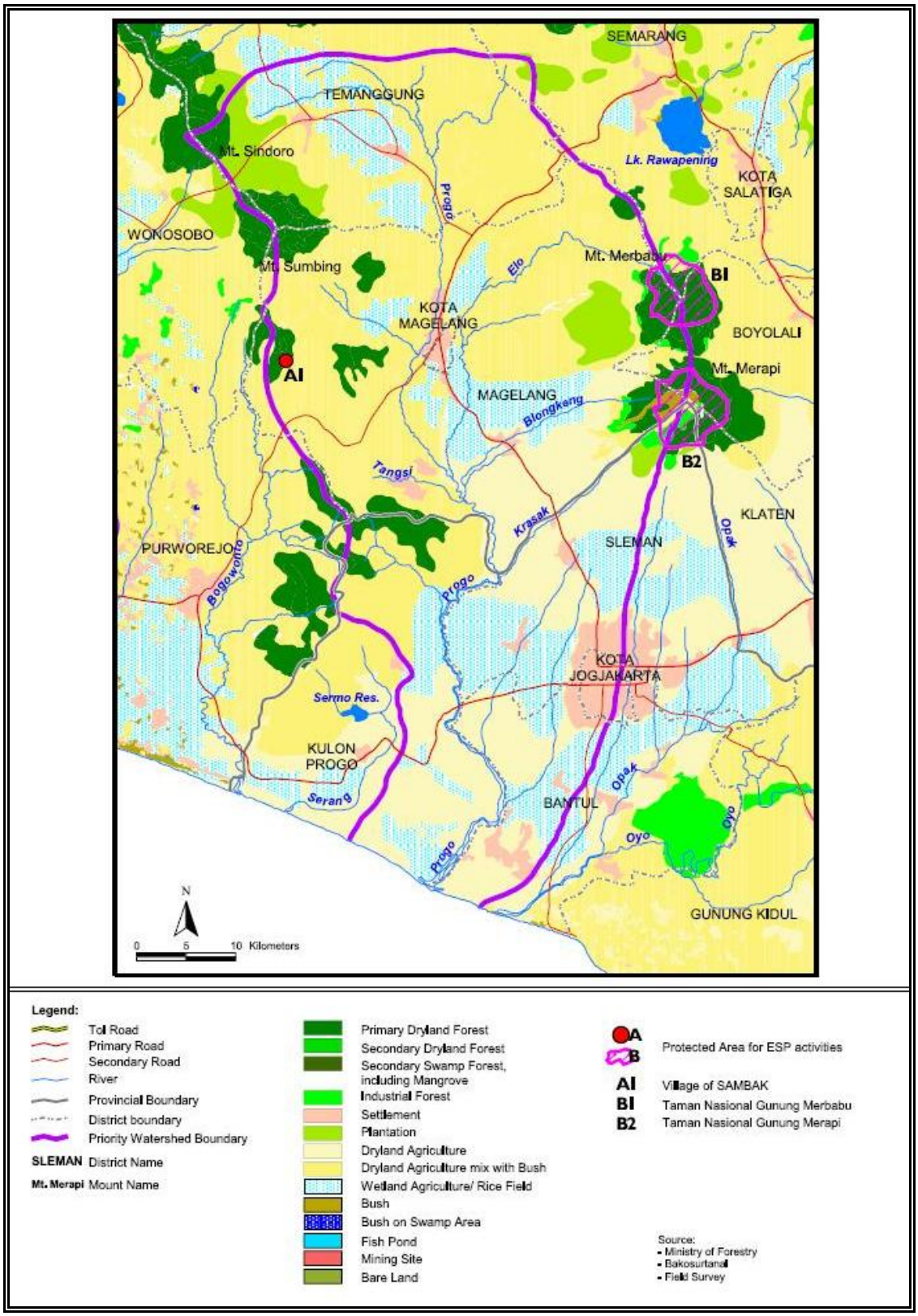

Figure 7. Location of conservation Protected Areas in Central Java inside, or connected by forest to, ESP priority watersheds.

frequent volcanic eruptions. This has resulted in endemic plants (e.g., *Castanopsis argentia* and *Vanda tricolor*). It also provides habitat for the protected Javanese Eagle (*Elang*) and *Macan Tutul.* Its geosysytem is also unique and has characteristic geological formations. Its 'sociosystem' reflects both a spiritual and supernatural link between Mount Merapi, Kraton Jogjakarta and the Southern ocean which is the basis for the local communities considering Merapi not a threat but a source of life.

- The Park also is a natural laboratory from which to study the complex interaction between volcanism and wildlife and community culture. In combination, all these attractions of the Park are important as tourism features that make a major contribution to understanding local and regional history.
- (www.dephut.go.id/INFORMASI/ TN%20INDO-ENGLISH/TN_GnMerapi.htm)

Challenges and Threats to these values

(www.dephut.go.id/INFORMASI/ TN%20INDO-ENGLISH/TN_GnMerapi.htm)

- The large number of government administrative units make coordinated management complex.
- Establishment of effective collaborative management.
- Arrangement of a management zonation system to protect the cultural values of the Park.
- Restoration and rehabilitation of the ecosystem in an optimal way to support the livelihood requirements of the villagers living in the Park.
- Organization of an infrastructure to make most advantage of the Park as a natural laboratory.
- Development of an effective 'buffer zone (*zona penyanggar*) that would protect Park values and engage surrounding communities in the management of the Park.
- Vegetation in the Park is mainly scrub with a small amount of disturbed forest. It is surrounded in part by Salak farms. Management of the Park forests needs to occur in such a way as to allow the traditional use of them as a source of grass for domestic stock and firewood (*Acacia* spp) and charcoal (*arang*) which is sold widely in the region.
- ESP staff visited the nearby Merapi Park sites of Kemiren and Sumbrung villages and reported (Kushardanto & Arsyad 2006) that soil, sand and rock mining is the biggest and observable threat to the Park. They observed 10 fully loaded 5-ton trucks as well as some smaller trucks operating there during their day visit. This mining is moving further into the Park, provoking some attempts by local NGOs and governments to reduce this threat. Most local people in this site are not involved in sand mining. In fact they oppose it because of its dust and sound pollution. The mining of sand (*galian C*) also adds little to the regional revenues (PAD) of Magelang and Jogjakarta. Villagers, who generally are not poor, also retain gardens into the center of the Park.
- The Indonesian environmental community rights organization WALHI questions the need for both Merapi and Merbabu to become a national park. And in their internet literature state that villagers living on the slopes of these mountains live in terror of the changed conservation status.

http://www.walhi.or.id/kampanye/hutan/konservasi/041129_merapi_merbabu_sp/). On 4 June 2004, the Central Java network of farmers protested about the proposed creation of TN Merapi; they cited reduced access to farm areas as the main reason for their protest and criticized the government for rushing the establishment of the Park and for not considering the impact of a Park on the local community (http://www.media-indonesia.com/berita.asp?id=97255).

- There are some 200 families living inside the Park. The families considered that it was their voluntary actions in the past which had protected the Park, particularly when fighting serious bushfires in 2002. They also felt that they were the custodians of the spiritual relationship of society and the mountain. And that it was they who protected the forest. Villagers already subscribe to the activity of planting five seedlings for each tree that they remove. They stated that during the dry season they simply had to be able to collect grass with 500m of the top of the mountain or fail to survive. (http://www.kompas.com/kompas-cetak/0406/07/teropong/1063845.htm
- Engagement of all stakeholders to assist conserve natural resource values in the Park will be a challenge.

Current conservation activities

- A local NGO, JAVLEC, is working with the local communities to reduce further encroachment by them into the Park. However, JAVLEC comment that their work is not always supported by Wahli, an environmental and community rights consortium, that is also active in the Park to initiate community based national park management.
- Gerakan Masyarakat Cinta Air (GMCA) initiated by Pasteur Romokirjito in kecematan Dukun Magelang, collects a database on the springs in the Merapi area and eductes the younger generation on the need to conserve of rivers, streams and springs.
- The LSM Maskumambang, provides education for sand miners by providing maps of potential sand mining areas that are not so important for biodiversity and other natural resources and encourages miners to use these lesser important areas. They also have built a data base on springs as well as train and inform government staff on hydrological monitoring techniques.

Taman Nasional Gunung Merbabu

- This Park is 5,725ha and covers three kabupaten (Magelang, Semarang and Boyolali). It was declared on 4 May 2004 (*Keputusan Menteri Kehutanan* No. 135/Menhut-II/2004).
- Both these above mentioned National Parks are intended to be managed by a collaborative consortium comprising: Departmen Kehutanan (in this case the *Direktorat Perlindungan Hutan dan Konservasi* DPHK), *Pemerintah Propinsi* (Central Java and Jogjakarta Governments), *Pemerintah Kabupaten* (Provincial Governments of Magelang, Semarang, Boyolali, Klaten and Slamen), *Perum PERHUTANI* (GoI Company controlling agroforestry on government lands) and other stakeholders.

Possible ESP activities

There are a number of entry points for ESP to assist the conservation management of these two national parks, particularly as they are such important catchment areas for the part of the Progo Watershed that supplies water to the general Magelang region. These include:

- Assist an initial identification of major habitat types in the Parks through GIS interpretation of existing vegetation, geology and topographic themes.
- Assist conduct a literature and rapid ground survey to identify important conservation targets in the Parks.
- Assist with the development of a conservation management zonation plan that identifies core,wilderness, and various use zones.
- Assist with the development of management action plans for these Parks and their immediate environs through stakeholder participation. And identify tactical solutions to abate threats to key conservation and cultural targets.
- Assist Javlec work with local communities on development of village level conservation action plans, particularly to reduce further encroachment of Kebun into the Marapi Park; Javlec could also be encouraged to join the ESP Pride Program.
- Assist LSM GMCA to make a river conservation video for use in their education program.
- Work with regional governments to better understand and document the cost structure of sand and soil mining. With this information, either ban such mining, or ensure a better revenue flow back to the Park to support conservation activities and reduce threats to water quality and water quantity caused by sand and soil mining (*galian C*).
- Raise conservation awareness by assisting build a public constituency for conservation of biological, water and land values in the area. Local NGOs working in these sites should also be encouraged to join the ESP Pride program so that they have an endemic capacity to carry out conservation education and conservation campaigns.

<u>Sumbing Mountains</u>

(Not a conservation PA, but protected through community MOU with PERHUTANI)

Kushardanto and Arsyad (2006) report on a visit to Sambak village, Sumbing Mountains, which has different biological and social characteristic from the Merapi and Merbabu Parks. Most importantly, local initiatives to protect forests is very strong in the Sumbing area. Despite the fact that forest area belongs to PERHUTANI (GoI forest company) villagers have built a consensus with the company (see Box 9). About 14 villages are involved in this collaborative forest and watershed management. Some eight villages still need clean water supplied; the other six villagers need water for irrigation. The ESP has a collaboration with Institute Pertanian Bogor, Faculty of Forestry, and RARE to institute an 18 month Pride Conservation Campaign (class and practical program) as part of their curriculum. One member of the YBL MASTA has joined the IPB Pride Program.

Villages Heads and the NGO that work in the Sumbing Mts feel that there is still a great challenge to raise awareness for the need to conserve water and manage natural resources in villagers in all 14 of these villages. This is despite the presence of a type of water forum and a common understanding that that water debit is decreasing.

Possible ESP conservation activities in Sub DAS Tangsi

- Assist develop a management action plans for the upper slopes of Sumbing Mountains through stakeholder participation. Action plans could be developed for small groups of villages to identify topical solutions to abate threats principally to conservation of land values. Solutions may well be idiocyncratic from village to village and may or may not involve planting of trees.
- Further strengthen the local 'water' forum.
- Improve understanding of local people of biodiversity, forest and water conservation.
- Encourage other local NGO YBL MASTA to join the ESP Pride program so that they have an endemic capacity to carry out conservation education and conservation campaigns.
- Leverage the success of the Sambak Agrowanawisata scheme to other Sumbing Mountain areas by working with YBL MASTA to increase their capacity to facilitate this work.
- Carry out a study to seek evidence that Desa Sambak has higher biological, water and and soil values tha comparative villages that do not have similar agroforestry practices. This information to be used to assist promote the Sambak Agrowana wisata conservation model.

Box 9. Sambak Village, Sumbing Mountains, West Java - a model of collaborative management of government forests outside PAs

- Sambak village and 13 other villages initiated and signed an MOU with PERHUTANI (GoI Forest Company). The Company allows pine (*Pinus* sp.) forest on ridges above the village to remain uncut for some returns on use of the forest.
- Villagers guard these forests from illegal activities.
- Villagers formed a cooperative with PERHUTANI to raise domestic stock and collect *Pinus* sap.
- Villagers also engage in forest tourism and education and formed Yaysan Agrowanawisata) in collaboration with University of Gaja Mada, Jogjakarta. This collaboration is the initiative of LSM YBL MASTA, Magelang.
- One member of the YBL MASTA has joined the IPB Pride Program sponsored by ESP.
- Desa Sambak has prevented the erosion pattern that is plainly seen on other mountain slopes in this area which are not clothed with trees.
- This mixed agroforest protects soils and potable water and allows a range of fauna and flora to survive, including top predators such as Marbled Cat (*Pardofelis marmorata)*, Bengal Cat (*Prionailurus bengalensis)* and the Javanese Eagle (*Spizaetus bartlesi*) - as well as Kijiang (*Muntiacus muntjak*) and a wide range of small leaf eater and warbler birds.

5.1.3. EAST JAVA

There are six ESP Priority watersheds in East Java: DAS Brantas; DAS Bondoyudo; DAS Rejoso; DAS Tempuran; DAS Mujur; and DAS Rejali. Two conservation PAs occur in these watersheds. Namely, Tahura Raden Suryo (DAS Brantas and DAS Rejoso) and Taman Nasional Bromo Tengger Semeru (DAS Mujur, Tempuran, Rejali and Bondoyudo).

Taman Nasional Tengger Semeru

- This Park of 50,267 ha was declared on 23 may 1997 (MenHut N0. 278/Kpts-VI/1997). It represents sub montane, montane and sub alpine ecosystems.

Natural resource and social values

- There are approximately 600 species of flora in the Park, including Mentigi (*Vaccinium varingaefolium*), Acacia (*Acacia decurrens*), Kemlandingan (*Albizia lophanta*), Cemara (*Casuarina junghuniana*), Adas (*Funicullum vulagre*), Jamuju (*Dacrycarpus imbricatus*), Cemara Gunung (*Casuarina* sp.), Eidelweis (*Anaphalis javanica*)and rare grass species such as *Styphelia pungieus*. The forests in the southern part of the Park have 157 species of orchid, such as *Malaxis purpureonervosa, Maleola witteana* and *Liparis rhodochila.*
- There are 137 bird, 22 mammal and four reptile species recorded from the Park. Protected species include the mammals: Trenggiling (*Manis javanica*), Luwak or Marbled Cat (*Pardofelis marmorata*), Rusa Deer (*Cervus timorensis*), Long –tailed Macaque (*Macaca fascicularis*), Kijang or Common Muntjak (*Muntiacus muntjak*), Macan tutul (*Panthera pardus*), Ajag or Wild Dog (*Cuon alpinus*); birds: Ayam Hutan Merah (*Gallus gallus*), Alap-alap bird (*Accipiter virgatus*), Rangkong or Hornbill (*Buceros rhinoceros silvestris*), Elang Ular Bido (*Spilornis cheela bido*), Srigunting hitam or Black Drongo (*Dicrurus macrocercus*) and Elang Bondol (*Haliastur indus*). (http://fwi.or.id/index.php?lang=ina&link=konservasi&f=Bromo.html).
- Four lakes (Ranu Pani, Ranu Regulo, Ranu Kumbolo and Ranu Darungan) are sited at approximately 2.200-2,400 m. a.s.l.). The following birds use these lakes: Rangkong (*Rhycticeros undulatus*), Bido (*Spilornis cheela*), Paok Ekor Biru (*Pitta guajana*) and Belibis (*Anas superciliosa*).

Challenges and Threats to these values

- Wildfires destroyed more than 500ha of the Park in August 2004. The grasslands are particular susceptible to burning (www.tempointeraktif.com/hg/nusa/jawamadura/2004/08/13/brk,20040813-13,id.html). Since 2004, a further 696 ha involving 52 events (www.mediaindo.co.id/berita.asp?id=72124). Clearly fires are a major treat to this Park.
- Illegal logging is also common in the Park.
- Encroachment by vegetable gardens.

Current conservation activities

- Management has established community guards (Pam Swarkarsa) to assist protect the forests. Most illegal logging and timber removal occurs in Kecamatan Wajak, Malang Selatan, and kawasan Nongkojajar, Kabupaten

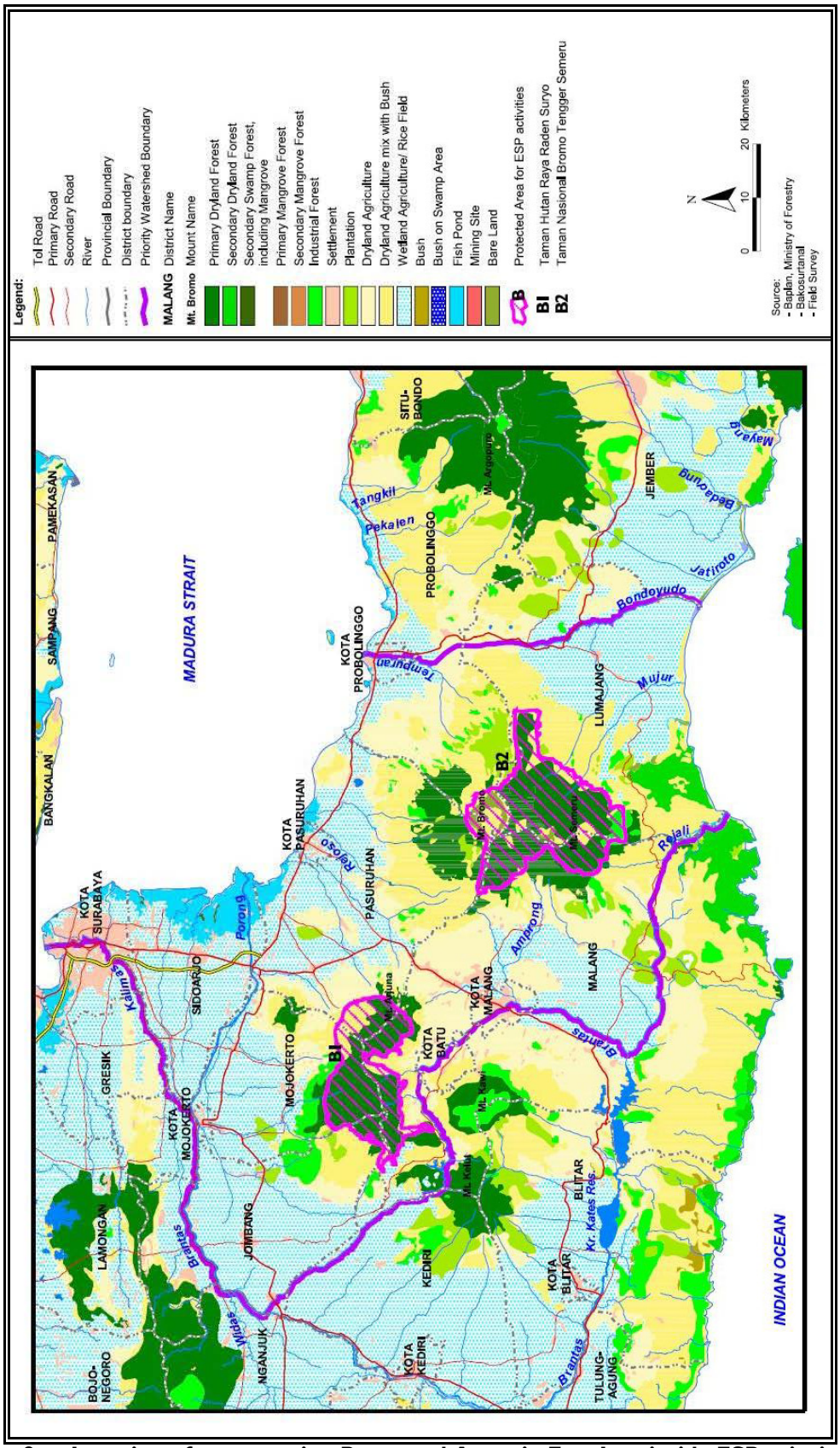

Figure 8. Location of conservation Protected Areas in East Java inside ESP priority watersheds.

Pasuruan (www.mediaindo.co.id/berita.asp?id=72124). The Park has a UPT Management unit and is reasonably well staffed. Brochures reflecting the management plan of the Park are available to visitors. The visitor center is professionally presented and illustrates the main natural resource values of the Park.

Possible ESP activities

- Assist management scenarios as requested by the Park. This may include a review of the major conservation management objectives and practices of the Park, particularly major biological aspects and those relating to water and land values.
- Facilitate the development of a stakeholder driven wider management action plan for the Park.
- Facilitate the establishment of a collaborative structure and process for the management of the Park that would involve stakeholders.
- Evaluate land status and values surrounding the Park (*zona penyangga*) and explore creative ways (easements etc) to obtain better conservation practice in these lands.
- Establish community based forestry practices on critical lands.
- Facilitate alternative livelihoods for nearby villagers to reduce encroachment by them in the Park. This could include development of orchid nurseries and tree nurseries to support forest rehabilitation

Tahura Raden Suryo

- This Tahura is 27,868ha.
- It was declared in 1990 (*Undang-Undang Nomor* 5 *Tahun* 1990) specifically for the conservation of protected animals and for explorative research by *Pusat Penampungan Satwa* (PPS) *Petung Sewu*, Malang.
- It is managed by the Dinas Kehutanan, East Java, which has established a management committee comprising (Tahura Raden Suryo) comprised of representatives of four kabupaten (Malang, Pasuruan, Mojokerto and Jombang) and Kota Batu. It is currently funded by APBD. It has two administrative branch offices . One in Kota Baru and the other in Kab. Mojokerto.
- **,**Natural resource and social values
- Tropical mountain forest

Challenges and Threats to these values

- General degradation of forest (/www.kompas.com/kompas-cetak/0303/12/jatim/177960.htm). The western part of the Tahura is more degraded than the eastern part. This prompted the Director of PPS to comment in March 2003 that he would focus all explorative efforts in the eastern part of the Tahura (www.kompas.com/kompas-cetak/0303/12/jatim/177960.htm). Restoration of the forests in the Tahura is supported by both the East Java Governor and the University of Brawijaya (http://prasetya.brawijaya.ac.id/jan03.html).
- Presence of a Jamur (mushroom) factory, some two kilometers inside the main gate of the Tahura created public concern in November 2002 because of the area of forest that was destroyed by the horticultural activities

required to service this factory. (www.kompas.com/kompas-cetak/0211/28/jatim/965.htm).

Current conservation activities

- There is a farmers group, Kolompok Tani Tahura in the area.
- The Tahura has a management staff numbering approximately 30. It has formed several NGO groups to assist with the management practice. Namely, Kolompok Pertani Tahura (farmers group), Komite Peran (forest guards).
- NGOs include PARAMITRA (community development focus), KALIANDRA (farmer conservation focus), SELOLIMAN (education focus) and PRING WOELOENG (children's education and water conservation).

Possible ESP activities

- Involve local community in the rehabilitation of the Tahura which requires such activities in almost 50 percent of its area.

5.2. SUMATRA

5.2.1. BANDA ACEH

There are three ESP Priority watersheds in Banda Aceh: Krueng Aceh; Krueng Merebo Sabee; and Krueng Geupu. Of these, only the Krueng Aceh Watershed has conservation protected areas. These are a cluster of three PAs: Jantho Cagar Alam, Gunung Seulawah Agam Cagar Alam and Cut Meurah Intan (previously called Cut Nyak Dhien) Tahura. These PAs were fairly recently joined by natural or semi natural vegetation but are now somewhat disconnected, particularly Jantho, from the other two. There has been recent discussions about combining Gunung Seulawah Agam and Cut Meurah Intan (Cut Nyak Dhien) into a single administrative entity.
The Krueng Aceh watershed is a thin elongate watershed that is about 10km wide and 30 km long and extends south to the base of the Central Barison Mountains. To the north it is bounded by Gunung Seulawah. The watershed has abundant natural springs and surface water resources but close to Banda Aceh little forest remains (DAI September and March 2005).

<u>Jantho Cagar Alam</u>

- This is a tropical humid forest ecosystem with an area of 8000ha. It is managed by BKSDA NAD (*Balai Konservasi Sumber Daya Alam*, Agency for Natural Resources). But there is no management staff on site

Natural resource values

- Natural water springs.
- Stands occur of the endemic pine, *Pinus merkusii.*
- Sumatran Tigers and Common Muntjak have been observed by villagers in recent times.
- Elephants used to be observed there but not since the habitat connection with Gunung Seulawah was broken.

- It has *Rafflesia micropylora*, the largest flower in the world, which is endemic to Aceh.
- It has endemic squirrels, *Callosciurus albesciurus*, that are said to be ecologically associated with *Pinus merkusii.*
- Kebun in the PA are rich in a wide variety of introduced fruit trees (some 49 species were counted at Desa Saree on 7 February 2006) which offer useful habitat for wildlife.

Challenges and threats

- Encroachment of forests by local village kebun.
- Lack of resources and capacity of BKSDA NDA to monitor forests and manage the PA.
- Removal of *Pinus merkusii* for firewood.
- Poor coordination between DINAS Kehutanan and BKSDA NDA.
- Wildfires.
- Decreased water debits in springs and wells.
- Illegal mining and galian C.
- Invasion of entire area by Alang alang grass, including ricefields.
- General lack of a conservation culture by the predominant Javanese transmigrants.

Current conservation activities

- No active conservation implementation was observed, including recovery of lands from invasive Alang alang

Possible ESP activities

Sme of the following are recommendations from DAI that relate to watershed management in Aceh (DAI March 2005 report), are also applicable to target PAs in Krueng Aceh:

- Establish a key stakeholder Forum DAS to control and plan use of water and land.
- Facilitate measures to conserve PAs by supporting government (BKSDA, NAD, BP, DAS, DINAS Kehutanan and Bappedala regarding monitoring (GPS and GIS training). Establish as watershed data base in close association with DINAS Pertanian and DINAS Perkebunan.
- Facilitate re-forestation GERHAN with a focus on Krueng Aceh for forest planting or agroforestry. Facilitate restoration of critical lands and land-use rights.
- Increase community awareness of the need to conserve natural resources in watersheds and their ecological systems.
- Identification of illegal logging.
- An evaluation of the uniqueness of *Pinus merkusii* and its ecological associates, with the view to preparing a management action plan to conserve this assemblage in this and other PAs and extend its distribution through restoration and rehabilitation within and adjoining the PA.
- An evaluation of alternative sources of firewood for villagers around the PA. Intensive plantings of trees and shrubs which can be continuously harvested, such as Sengon and Kaliandra, respectively, may mitigate the dominant threat to *Pinus merkusii.*
- The decreasing water debit noted at Saree may have long-term effects on

biodiversity as well as villagers. The stated connection between decreased water flow from the springs at certain periods of the year and dramatically lowered water table reflected in village wells, may be more complex than appeasr at first sight. A localized hydrological survey to evaluate surface and

ground waters relationships in and around Desa Saree may inform conservation action.

Gunung Seulawah Agam Cagar Alam/ Hutan Lindung

- This is a low lying PA, 0-40m asl, which lies at the foot of Gunung Seulawah Agam. It is physically connected to Cut Meurah Intan (Cut Nyak Dhien) Tahura.

Natural resource values

- Water source for the Krueng Aceh.
- Retains both Sumatran Tigers and Elephants
- It has Rafflesia micropylora

Challenges and threats

- A major challenges faced by this PA is that the main road traversing Aceh passes though it allowing ready access to the center of the area.
- Invasion from exotic plants, in particular Alang alang grass (Imperata).
- Illegal logging and wood extraction.
- Removal of vast amounts of material, including gravel and rocks, for the reconstruction of Aceh following the tsunami.

Current conservation activities

- None observed.

Possible ESP activities

- Support single management authority for this Cagar Alam and the conjoined Tahura.

Cut Meurah Intan (Cut Nyak Dhien) Tahura

- This has an area of 6,300ha. It was declared on 15 March 2001 (Menhut No. 95/Kpts-II/2001).

Natural resource values

- The Seulawah ecosystem, including the Seulawah Tahura, was considered by Conservation international as a priority system for conservation in Sumatra (http://nrm.bappenas.go.id/HLN/01_30.html).

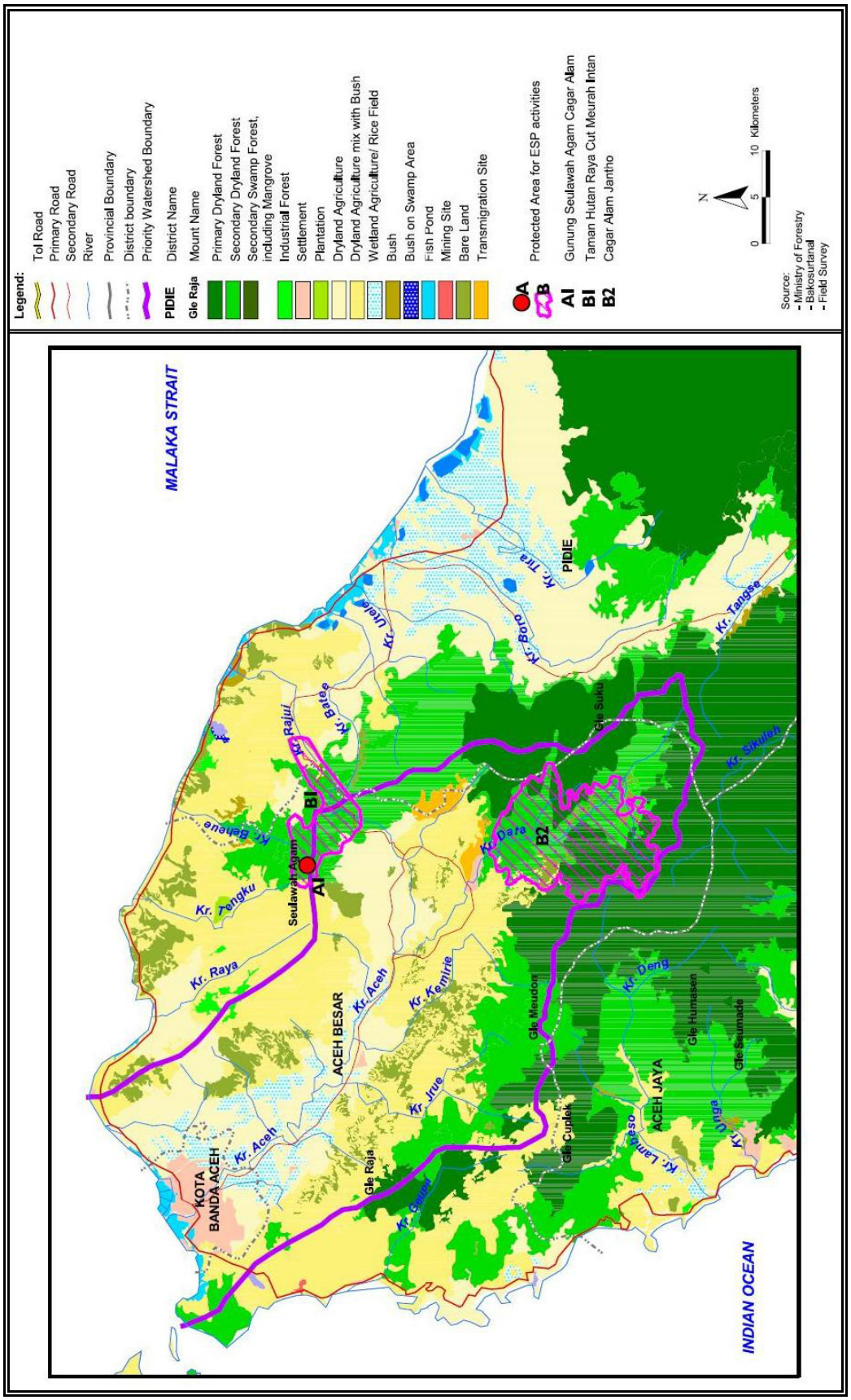

Figure 9. Location of conservation Protected Areas in Banda Aceh inside ESP priority watersheds.

- It was included, along with Leuser and Angkola as part of a connecting 'green' corridor that was to reach the length of Sumatra. It was to be funded as part of the Critical Ecosystem Partnership Fund/CEPF. The purpose of the fund was to protect internationally important fauna and flora assemblages. Donations to the fund were made by Conservation International (CI), Global Environment Facility (GEF), Government of Japan, MacArthur Foundation and the World Bank. The grants were to be focused on research, investigation, practice and participation, compensation for loss of traditional lands. However, according to Kompas, no priority conservation activities have occurred in Tahura Seulawah to this date (http://www.kompas.com/kompas-cetak/0604/19/opini/2590773.htm).
- Its wildlife can be expected to be representative of that in the mountain areas of Aceh.

Challenges and threats

- Tahura Seulawah.habitats have been degraded and heavily degraded in very recent times (http://www.kompas.com/kompas-cetak/0604/19/opini/2590773.htm
- There has been some felling and burning of *Pinus merkusii* at the edges of the Park.
- *Pinus merkusii* is said to regrow well in Alang alang and to require little management. This species may well be more widely planted to reduce *Alang alang*- which although not necessarily inimical to the maintenance water deficits in the Krueng Aceh, does decrease soil fertility and increases the risk of wildfires.

Current conservation activities

- This Tahura recently received 200 million Rp for the conservation of its *Pinus merkusi.* A master plan has been prepared for this activity, which includes a conservation management zonation plan. This plan allows for mixing of tree species in the buffer zone (*zona pemanfaatan*), but only native species may be planted in the core zone (*zona inti*) and wilderness zone (*zona rimba*). A management unit is not yet established but management favors full participative collaborative management involving key stakeholders. There is a small herbarium in the central enclave settlement

Possible ESP activities

- As mentioned earlier, assist increase knowledge of *Pinus merkusii* and its ecological associates as basic information for development of conservation action plans for this plant and animal community.
- Assist conduct a GIS based change analysis of the distribution of *Alang alang* (*Imperata cylindrica*) in the ridges and mountain areas of this Tahura and surrounding ridges and mountain areas, using recent and archival Landsat images from the mid 1970s. This to gain information on whether *Alang alang* continues to expand and pose an increasing threat to biological diversity in the Tahura and surrounds-or if the grass has a stable distribution.
- Assist prepare a conservation action plan based on the nature of the threat of *Alang alang* to overall watershed biological values. Management guidelines and information are available in Friday et al. (1999).

5.2.2. NORTH SUMATRA

There are three Priority watersheds selected by ESP in North Sumatra. These are: DAS Deli; DAS Belawon; and DAS Percut, (DAS Wampu?). Protected areas are Taman Nasional Gunung Leuser (DAS Wampu); Tahura Bukit Barisan; Sibolangit Cagar Alam - which connects with Sibolangit Taman Wisata Alam (DAS Deli) and Suaka Margasatwa Garang Gading (DAS Wampu/ DAS Belawan).

The 120ha Sibolangit Nature Reserve was declared through Decree from the Ministry of Agriculture No.636/ Kpts/ Um/9/1980, but was reduced by 24.9ha to accommodate Sibolangit Nature Recreation Park (Taman Wisata Alam Sibolangit). This declaration was strengthened with the Decree of the Ministry of Agriculture No.363/ Kpts/ Um/ 11/ 1980 on November 5, 1980.

Tahura Bukit Barisan

- It covers an area of approximately 51,600ha and is located across four districts. It was declared a Grand Forest Park by Presidential Decree No. 48 /1988 on 19 November 1988.
- It includes protection forests (Sibayak I, Simancik I, Sibayak II, Simancik II and Sinabung), which cover an area of 38,273ha, Gunung Leuser National Park (13,000ha), Sibolangit Nature Reserve/Nature Recreation Park (120 ha), Lau Debuk Debuk Recreation Park (7 ha) and Sibolangit Camp Sites (200 ha). The Tahura is dominated by two peaks Gunung, Gunung Sibayak (2211m) and Gunung Sinabung (2451m).
- The cultural groups around the Tahura include Melayu, Karo, Aceh and Batak. Most are vegetable (cabbage, beans, carrots etc) and fruit farmers (oranges and Markisa).

Natural resource values

- Contributes significantly to water quality and volume in the watershed.
- Immense tourist potential with craters, sulphurous fumerols, hot water springs, waterfalls, general panoramic views, flower and fruit gardens, walking trails and camping areas.
- It is a strategic area to connect other PAs in the region.
- Flora includes: Tusam (*Pinus merkusii*), *Podocarpus* sp, *Toona sureni,* Simar Telu (*Schima wallichii*), Tulasan (*Altingia exelsa*), Meang (*Alseodaphne sp.*), durian, dadap, rambutan, pulai, aren and rotan. Planted trees include *Pinus caribea, Pinus khasia, Pinus insulares, Eucalyptus* sp. and *Agathis* sp.
- Mammals include: Orangután, Tigers, Siamang (*Hylobates)*, Wau-wau (*Hylobates lar*), Babi Hutan (Sus scrofa), Mouse Deer or Kancil, Rusa Deer and Trenggiling (ant-eater). Birds, the Javan Eagle or Elang (*Haliantus indus*), Rangkong (*Buceros* sp) and Ayam Hutan (*Gallus varius*).

Challenges and threats

- Illegal logging.
- Forest conversion and kebun encroachment.
- Replacement of native species with bamboo.
- Pollution from rubbish dumps.
- Removal of humus from the forests for sale as 'potting' mixture.

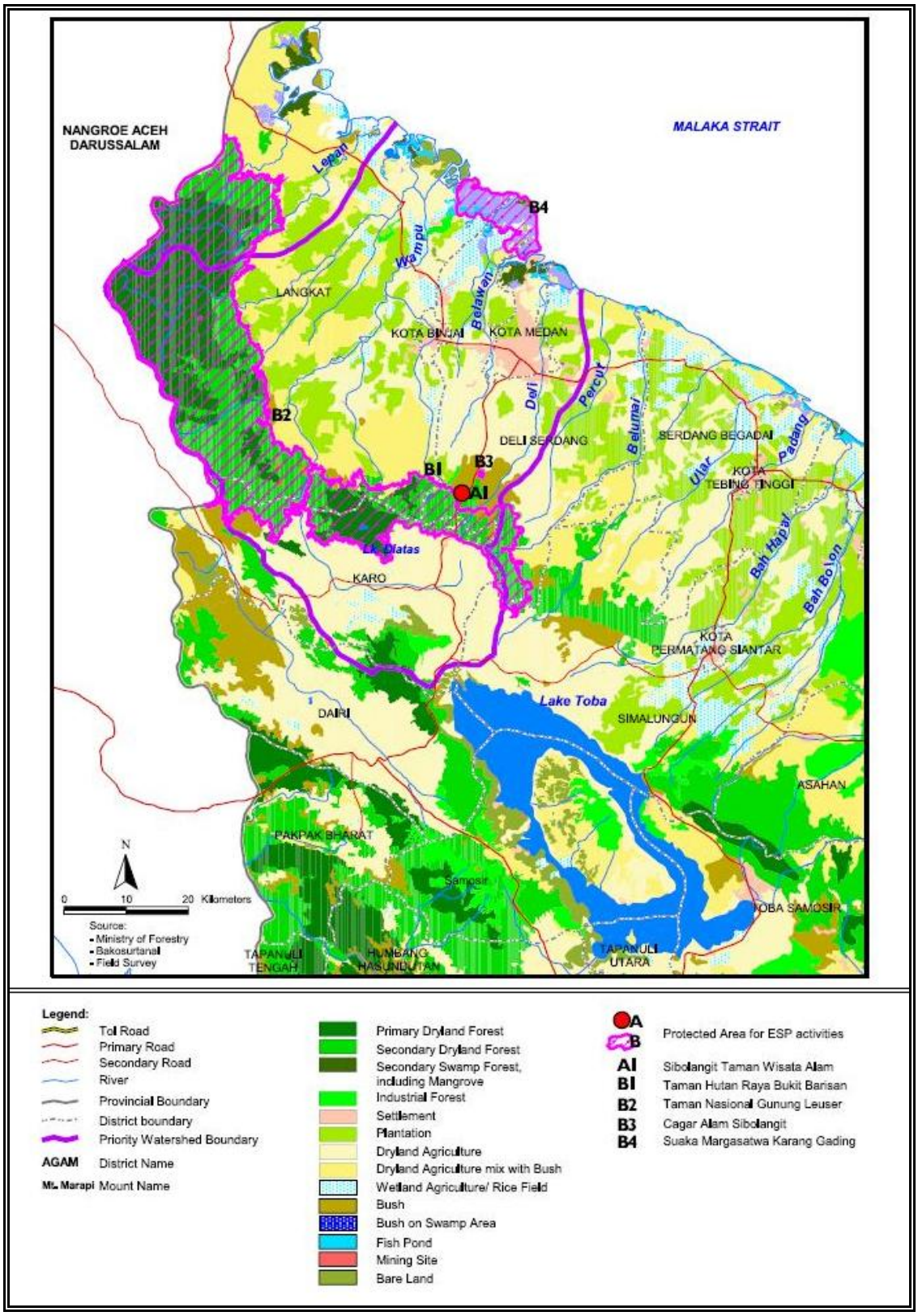

Figure 10. Location of conservation Protected Areas in North Sumatra inside, or connected by forest to, ESP priority watersheds.

- Habitat fragmentation.
- Trade in wildlife.
- Hunting.
- Absence of a management plan, including conservation management zonation
- Insufficient human resources and capacity to effectively manage the Park.
- Insufficient awareness among communities and provincial government of benefits, costs, and responsibilities of managing the Tahura.
- Absence of significant sustainable economic incentives for communities, local government or the private sector to support watershed management.
- Lack of stakeholder involvement in management of the Park.

Current conservation activities

- Organisation, governance and managementof the Tahura is currently through BKSDA and the Departemen Kehutanan, but a local regulation of North Sumatra Province (PERDA) No. 13 /2005 and recent understandings between the province and central Government will soon see the Tahura under the jurisdiction and management of the province. The management center is in *Desa* Tongkeh, *Kecematan* Tiga Panah, *Kabupaten* Karo some 59 km south of Medan. At this center is the entrance to the Tahura with walking paths into it. It also has a research office, information center, tourist shelter, library, museum, playground, swimming pool and parking area.
- Local community groups formed to reduce garbage disposal into streams and to generally clean up the water resources.

Possible ESP activities

- Facilitate a natural resource inventory to enable identification of important conservation objectives.
- Facilitate the development of a conservation management action plan through stakeholder involvement that incorporates conservation management zones and specific management solutions to abate threats to conservation targets.
- Facilitate both a collaborative management structure and management practice.
- Assist identify funding sources for conservation action plans.

5.2.3. WEST SUMATRA

There are three Priority watersheds selected by ESP in West Sumatra: Batang Hari; Batang Kuantan; and Batang Arau (which has three Sub watersheds: Batang Kuranji, Batang Air Dingin, and Batang Arau).

The conservation PA in these watersheds are: Tahura Dr Mohammad Hatta (Batang Arau/ Batang Kuranji/ Batang Air Dingin); Gunung Merapi Suaka Alam (Batang Kuantan); Gunung Sago- Malintang- Karas Suaka Alam (Batang Kuantan); Gunung Lembah Harau Suaka Alam (Batang Kuantan); Beringin Sati Cagar Alam (Batang Kuantan); Lembah Anai Cagar Alam (Batang Kuantan); Batang Pangean I &II Suaka Alam (Batang Hari); and northern part of Taman Nasional Kerinci Seblat (Batang Hari).

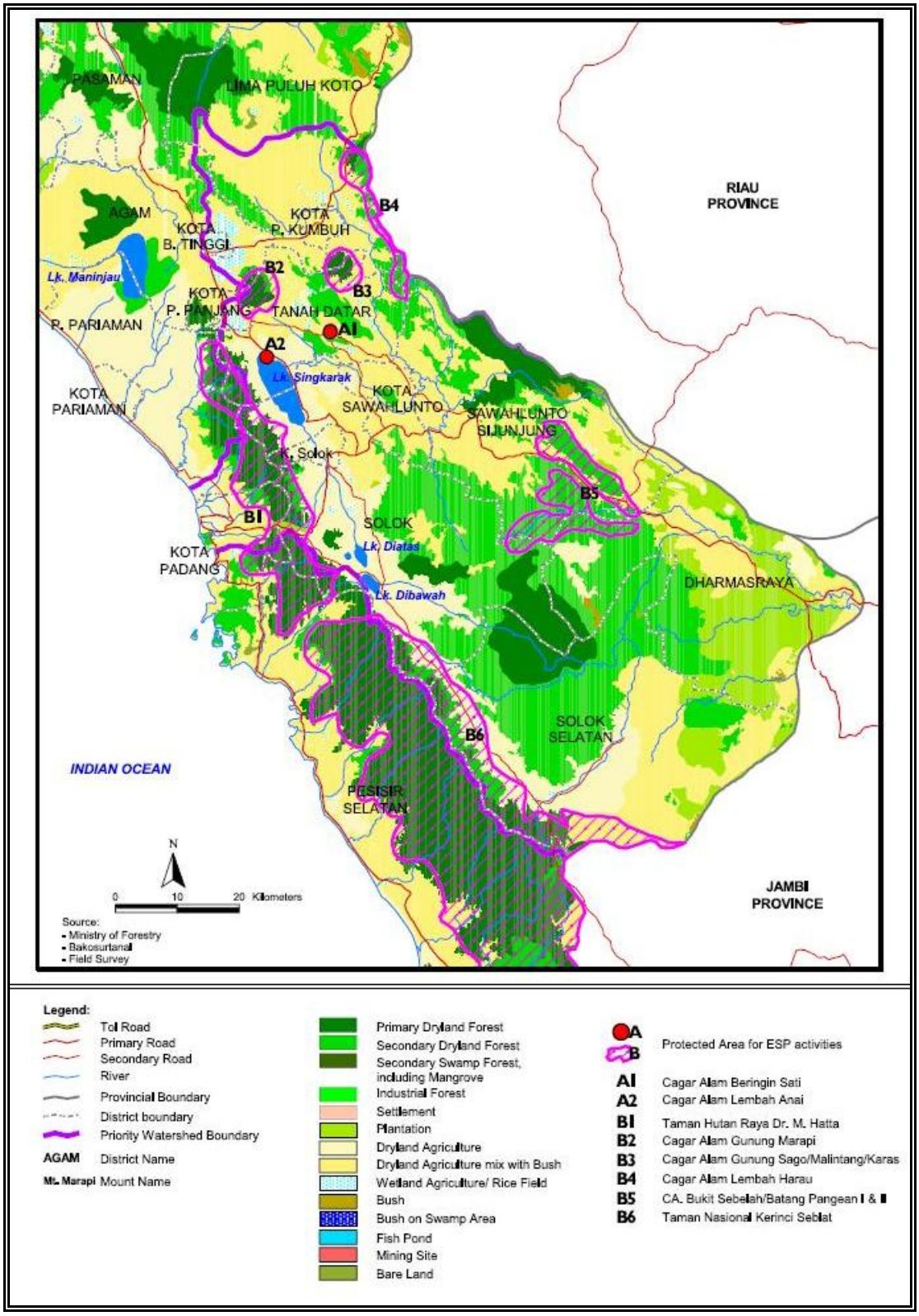

Figure 11. Location of conservation Protected Areas in West Sumatra inside or connected by forest to ESP priority watersheds.

Tahura Dr Mohammad Hatta

- It has an area of 71,807ha. And was initially declared as Suaka Alam Barisan I by *Keputusan Menteri Pertanian* No. 623/Kpts/Um/8/82) on 22 August 1982. It lies in Kab. Padang Pariaman, Kab. Tanah Datar and Kab. Solok. It is managed by Sub Seksi KSDA Padang Pariaman

Natural resource values

- The major water catchment area for Kota Padang and has great potential as an area to generate hydro electricity for transmission to Sumbar- Riau.
- A large region of primary forest and high quality secondary forest, protected by the hilly and rugged topography.
- Sumatran Tiger present.
- Native endemic orchids present.
- Has Lake Singkarak, Kab. Solok, which has the endemic fish, Bilih, which is economically important and is exported to Malaysia and Singapore.
- In Kab. Tanah Datar, there are a number of villages bordering lakes engaged in agroforestry by planting Andalas (*Morus macraura*), Kapas/ Kapuk (*Ceiba petandra*) and Kemiri (*Aleurites moluccana*).
- High conservation value because of its physical connection with Kerinci Seblat.

Challenges and threats

- Biodiversity of Tahura not surveyed.
- Housing and road infrastructure developments are advancing towards the area of the Tahura from coastal situations following the 2005 Tsunami.
- Illegal logging with forests being felled at the periphery of the Tahura.
- Huntering.
- Collection of non-timber products.
- The local community is generally unaware of the natural resource values of the Tahura.

Current conservation activities

- There are several NGOs involved and interested in the management of the Tahura. Viz, Yayasan AFTA – alumni *Fakultas Pertanian Universitas Andalas*, who focus on environmental and agricultural issues.
- LP2M, *Lembaga Pengembangan dan Pemberdayaan Masayarakat* – involved in a small grant program (*Perempuan dan Sanitasi*) that operates close to the Tahura (area of Koto Lalang).
- DINAS *Kehutanan* has a management plan for the Tahura and some staff to carry out management activities.
- ESP is currently engaged with *Pemerintah Kota* Padang to develop a collaborative stakeholder driven management plan.
- ESP facilitated the development of Forum PEDAS to become involved in the management and raising awareness of DAS in the Padang municipality

Possible further ESP activities

- Facilitate a natural resource inventory to enable identification of important conservation objectives.
- Facilitate the development of a conservation management action plan

through stakeholder involvement that incorporates conservation management zones and specific management solutions to abate threats to conservation targets.
- Facilitate both a collaborative management structure and management practice.
- Assist identify funding sources for conservation action plans.

Gunung Marapi Suaka Alam

- Also called Suaka Alam Marapi Singgalang – Tandikat and sometimes referred to as Merapi Singgalang Tandikat's Nature Reserve.
- It has an area of 9,690ha and was declared by keputusan Menteri Pertanian No. 623/ Kpts/Um/8/1 982 on was designated on 22 August 1982. It falls in Kab. Agam and Kab. Tanah Datar. It is managed by BKSDA. Annual rainfall averages 2,743mm per year.

Natural resource and other values

- A tall (2,891m) active volcano.
- Soils are andosols and red and yellow podsols.
- Culturally significant because historically it is considered that the area around this mountain was the location of the first communities of Minangkabau people.
- Very popular by visitors interested in nature.
- The flora list indicates a rich and interesting vegetation dominated by the following families: Lauraceae, Eupborbiaceae, Dipterocarpaceae and Guttiferae. It includes: Tambilla (*Certanopsis* sp); Binting (*Bigchoffia javanica*); Medang (*Litsea* sp.); Menambang (*Vernonia arborea*); Sapek (*Altingia exselsa*); Cemara Gunung (*Casuarina junghuniana*).
- The faunal lists also indicate that this forest is part of an important conservation area and has several protected species present. It includes the following mammal species: Siamang (*Hylobates syndactylus*), Sumatran Tiger (*Panthera tigris sumatrensis*), Forest Goat or Kambing Hutan (*Caprinonis sumatrensis*), Sambar Deer or Rusa Sambar (*Cervus unicolor*), Kijang (*Muntiacus muntjac*), Tapir (*Tapirus indicus*; Common Pig or Babi Hutan (*Sus scrofa*).
- Bird species include Ayam Hutan (*Gallus gallus*); Burung Punai (*Treron* sp), Burung Enggang http://www.dephut.go.id/informasi/propinsi/sumbar/sa_merapi_singgalang.html

Challenges and threats

- Active volcano.
- Many visitors.
- No wildlife or social surveys to identify important conservation objectives in the Suaka Alam.
- No current zonation or conservation management plan to manage the impact of visitors on the vegetation.
  Inadequate management staff.

Current conservation activities

- Not known.

Possible ESP activities

- Facilitate a natural resource inventory to enable identification of important conservation objectives.
- Facilitate the development of a conservation management action plan through stakeholder involvement that incorporates conservation management zones and specific management solutions to abate threats to conservation targets.
- Facilitate both a collaborative management structure and management practice.
- Assist identify funding sources for conservation action plans.
- Facilitate a GIS driven assessments of natural habitats in the surrounding areas to evaluate the development of natural vegetation corridors to link it with other areas of nearby natural habitat.

Gunung Sago- Malintang- Karas Suaka Alam

- It has an area of 5,486ha and was declared by the governor KDH Tk1, West Sumatra N0. 471/VI/Bappeda-78 on 12 June 1978 and Keputusan Menteri Petanian No. 623/kpts/Um8/82 on 22 August 1982.
- It is located in Kab. Tanah Datar and Kab. 50 Kota at high altitudes of 1,362 to 2,262m a.s.l. and receives an average annual rainfall of 2,743mm per year.

Natural resource values

- Was in part established to assist the conservation of the Sumatra Tiger.
- Has the bathing area Pemandian Aia Tabik, which is an important local visitor attraction.
- Dominant plants include Kalek, Medang Bundar and Resak. Other charismatic plants are the huge flower (*Amorphallus titanum*) and the endemic giant parasitic plant *Rafflesia arnoldi*.
- Fauna includes the mammals Owa (*Hylobates agilis*), Kambing Hutan, and Babi Hutan (*Sus scrofa*); the birds Pelatuk, Tekukur (*Streptopelia* sp.), Drongo or Srigunting (*Strunicullus* sp.),Eggang (*Anthroccoceros* sp.), Punai, Gagak Hitam (*Fan cordiciae*), Buring Hantu or Barn Owl (*Tito alba*), and Sesap Madu (*Meliphoca* sp.).
- Soils are a complex of red and yellow podsols, latosols and litosols

Challenges and threats

- Unknown

Current conservation activities

- Unknown

Possible ESP activities

- Assess the major conservation objectives and their threats prior to an evaluation of possible ESP involvement.
- Facilitate a GIS driven assessments of natural habitats in the surrounding areas to evaluate the development of natural vegetation corridors to link it with other areas of nearby natural habitat.

Gunung Lembah Harau Suaka Alam

- It has an area of 271 ha and was declared by GB15 and gazetted in October 1933. It is in Kab 50 Koto.

Natural resource values

- Orchids present.
- Waterfalls.
- Hot springs.
- Scenic attractions.

Challenges and threats

- Unknown

Current conservation activities

- Unknown

Possible ESP activities

- Assess the major conservation objectives and their threats prior to an evaluation of possible ESP involvement.
- Facilitate a GIS driven assessments of natural habitats in the surrounding areas to evaluate the development of natural vegetation corridors to link it with other areas of nearby natural habitat.

Beringin Sati Cagar Alam

- Very small PA with an area of only 0.03ha. It was declared by Gubernur Besluit No. 6 stbl 683 on 16 November 1924. it is located in the center of Kota Batusangkar

Natural resource values

- It was established to protect Ficus benjamina (beringin) trees that are reportedly 1000 years old.

Challenges and threats

- No information

Current conservation activities

- No information

Possible ESP activities

- Not planned.

Lembah Anai Cagar Alam

- It is a small (221ha) reserve (G.B No. 25 Stbl No. 756) and declared on 18 December 1922.
- Located on the main road from Padang to Bukit Tinggi in Kab. Tanah Datar.

Natural resource values

- Although currently too small to conserve Sumtran Tigers, it was intended for this purpose and also for Rusa Deer (*Cervus timorensis*), Siamang (*Hylobates syndactylus*) and an assemblage of birds.
- It has been suggested that - along with Suaka Alam Barisan I, Taman Wisata Alam Mega Mendung, Suaka Alam Singgalang Tandikek - it should form a new 'Taman Nasional Lembah Anai', which would have an area of 85, 825.0ha (http://www.warsi.or.id/Bulletin/AlamSumatera/VOL1_No7/AS7_12.htm). It is not clear how far this proposal has progressed, although the DepHut map

  "Kawasan Konservasi di Indonesia , December 2003" draws a large area (1000,000ha) as a Perluasan Lembah Anai and lists it as a Cagar Alam; this area joins those referred to above as potentially forming a new Taman Nasional Lembah Anai.
- Has an attractive panorama including a waterfall and is frequently visited by locals.

Challenges and threats

- Its small size, number of visitors and proximity to the main road have damaged its habitat. It would require intensive management and staff skilled in management of visitors to conserve it in the future.
- Its relevance to a larger PA concept needs to be supported. Particularly as its contribution to the proposed enlarged Cagar Alam/Taman Nasional would contribute to a large area of key catchment areas. These catchment remain reasonably well clothed with mountain rainforest- perhaps protected in large part by the rugged topography that makes illegal logging difficult on them.
- *Current conservation activities*
- Non known.

Possible ESP activities

- To assist in the proposal to enlarge Lembah Anai Cagar Alam to form a very large PA. As part of this assistance carry out a bench top review of potentially good corridors of natural forest that would connect this enlarged PA to the north eastern tip of Taman Nasional Kerinci Seblat. This would form a continuous protection for these narrow and short multiple watersheds that flow along the western edge of the West Sumatra mountain ranges.

Batang Pangean I &II Suaka Alam

- Suaka Alam Batang Pangean I has an area of 12,200ha. It was declared by Surat Keputusan Menteri Hutbun No. 422/ Kpts II/1999 on 15 June 1999. It is in Kab. Sawahlunto/Sijunjung/Solok.
- Suaka Alam Batang Pangean II has an area of 37,500ha. It was declared by Surat Keputusan Menteri Hutbun No. 422/Kpts II/2000 and was gazetted on 2 August 2000. It is in Kab. Sawahlunto/Sijunjun/Solok (http://www.ditjenphka.go.id/kawasan/data/all.pdf).
- These two PAs have been listed as a combined PA formed in 1982 (http://www.dephut.go.id/informasi/propinsi/sumbar/ca_batang_pangean.html).

Natural resource values

- Batang Pangean I has a rich assemblage of relatively intact tropical lowland forest with economically important tall trees, including Dipterocarpaceae, Meranti Ketuba (*Hopea dryobalanocoides*), Laban (*Vitex pubescens*), Bintangur (*Callphylum* sp.) Paning-paning, Kalumpang (*Sterculia cortada*)and Resak (http://www.ditjenphka.go.id/kawasan/data/all.pdf).
- Batang Pangean I has an interesting assemblage of mammals including several endangered species. These include Sumatran Tigers (*Panthera tigris*), Macan Dahan or Clouded leopard (*Neofelis nebulosa*), Rusa, Kijang, Beruang Madu or Sun Bear (*Helarctos malayanus*), Kambing Hutan or Mountain Goat (*Capricornis sumatraensis*), Siamang (*Hylobates syndactylus*), Common Pig (*Sus scrofa*). Birds include Enggang (http://www.ditjenphka.go.id/kawasan/data/all.pdf).
- Batang Pangean II is has great tourist potential with splendid views of Bukit Sabalah.
- Batang Pangean II has potential for both limestone and coal mining.
- Batang Pangean II has considerable lowland evergreen forest and like Pangean I is dominated by the Dipterocarpaceaea and Myrtaceaea plant families.
- Batang Pangean II has similar mammals present to those found in Pangean I but in addition has the Kukang or Slow Loris (*Nycticebus coucang*) present (http://www.ditjenphka.go.id/kawasan/data/all.pdf).

Challenges and threats

- Has many unexplored limestone caves and therefore probably also has an extensive undocumented bat fauna.
- Illegal logging.
- Hunting.
- Nearby to Pangean II, swiftlet (*Collocalia maxima*) nests are collected.

Current conservation activities

- Unknown

Possible ESP activities

- Facilitate a natural resource inventory to enable identification of important conservation objectives.
- Facilitate the development of a conservation management action plan through stakeholder involvement that incorporates conservation management zones and specific management solutions to abate threats to conservation targets.
- Facilitate both a collaborative management structure and management practice.
- Assist identify funding sources for conservation action plans.
- Facilitate a GIS driven assessments of natural habitats in the surrounding areas to evaluate the development of natural vegetation corridors to link it with other areas of nearby natural habitat.

Taman Nasional Kerinci Seblat

- It has an area of 1.375.349,867ha. It was initially declared by Menteri

Pertanian, Tahun 1982 and finalized by Menteri Kehutanan dan Perkebunan (SK No. 901/Kpts-V/1999). It was gazetted in 1982.

- It covers the Provinces of Sumatera Barat, Jambi, Bengkulu dan Sumatera Selatan and is defined by the following geographic coordinates: 1°17' - 3°36'

  LS, 100°31' - 102°44' BT; Its height ranges from 500 – 3.805 m a.s.l.; with Gunung Kerinci at 3,805 m. a.s.l. Its rainfall averages 3,000mm per year.

Natural resource values

- An extremely important example of tropical rainforest that ranges from lowlands to sub-alpine serta beberapa ekosistem yang khas antara lain rawa gambut, rawa air tawar dan danau.
- It has 4,000 species of plants that are dominated by Dipterocarpaceae. It also has plants that are rare and endemic, such as the kerinci Pine (*Pinus merkusii strain* Kerinci), Kayu Pacat (*Harpulia alborea*), Bunga Raflesia (*Rafflesia arnoldi* and *R. hasseltii*), and Bunga Bangkai (*Amorphophallus titanum* and *A. decus-silvae*).
- It has 37 mammal (including the rare Golden Cat (*Catopuma temminckii temminckii*), 10 reptile, 6 amphibia, 8 primate and 139 bird species (including Burung Rangkong (*Buceros rhinoceros sumatranus*), Burung Gading (*Rhinoplax*)
- It has a has a number of tourist attractions in addition to its wildlife, including splendid scenic panoramas –including Kerinci Peak, camping sites, active volcanoes, hot water springs, Gunung Tujuh Lake, the highest volcanic lake in Sumatra and expansive cave complexes.
- The Kubu raditional cultural group.

Challenges and threats

- Because of its very large area, this Park experiences most threats known to occur in an Indonesian PA., Namely, numerous bordering villages, severe encroachment, illegal logging, illegal removal of non-forest products, illegal hunting, Additionally it has inter Provincial problems with coordinating management strategies and tactics.

Current conservation activities

- A large GEF grant in the late 1990s failed to greatly improve conservation management of the Park because it coincided with the removal of the Soeharto regime and a period of extensive vandalism of Indonesian national parks by surrounding communities and outside businesses, who took advantages of the situation. Some gains were, however, made- including clearer boundary definition in some parts of the Park.

Possible ESP activities

- This Park is only approximately 50 km from Padang and is connected by contiguous forest to the large forested areas that are proposed to form an expanded Lembah Anai Cagar Alam (see above). As such, management of natural resources in northern tip of TN Kerinci Seblat, including biological diversity, is important to the ESP focus areas in West Sumatra.
- Review the progress made and information produced by the GEF funded project in northern part of the Park that extends into West Sumatra. Use this and other GIS based data to support the development of a corridor to link Kerinci Seblat with to the proposed extended Lembah Anai Cagar Alam.

- Carry out a lessons learnt study of the Kerinci Seblat experience to evaluate the Integrated Conservation Development Project approach for the management of proposed large conservation PAs in West Sumatra.

6. REFERENCES

Adams, W.M. and Hulme, D. (2001). 'Conservation and Communities: Changing Narratives, Policies and Practices in *African Conservation'*, pp. 9–23 in Hulme and Murphree, eds.

Anon (1985). *DAS/sub DAS prioritas serta lokasi dan luas lahan kritis sebagai sasran penghijauan dan reboisasi dalam Repelita IV. (Sekretariate Pengendali bantuan Penghijauan dan Reboisasi Pusat Jakarta*, Agustus 1985).

Anon (2003). Identifying, Managing, and Monitoring High Conservation Value Forests in Indonesia: A Toolkit for Forest Managers and other Stakeholders (The Rainforest Alliance & Proforest, August 2003).

Anon (2005a). *Pengelolaan kolaboratoif Peraturan Menteri Kehutanan* No. P.19/Menhut-II/2004 (*Departemen Kehutanan, Republik* Indonesia, Jakarta).

Anon (2005b). *Buku Informasi Kawasan Konservasi* (Balai Konservasi Sumber Daya Alam Jawa Tengah (Semarang)

Barrow, E. and Murphree, M. (2001). 'Community conservation: from concept to practice', pp. 24–37 in Hulme and Murphree, eds.

Berkes, F. (1997). New and Not-so-New Directions in the Use of the Commons: Co-management. *Common Property Resource Digest* **42**:5-7.

Borrini-Feyerabend, G.; Farvar, M. T.; Nguinguiri, J. C. and Ndangang, V. A. (2000). *Co-management of Natural Resources: Organising, Negotiating and Learning-by-Doing. GTZ and IUCN* (Kasparek Verlag, Heidelberg, Germany).

Bouvier, I (2006). Integrated Spatial Planning Training Report and Recommendations. Internal report to Environmental Services Program (ESP, Jakarta).

Bruijnzeel, LA. (2004). Hydrological Functions of Tropical Forests, Not Seeing the Soil for the Trees? Pp. 185-228 *In* (Eds T.P. Tomich; M. van Noordwijk; and D.E.Thomas) *Environmental Services and Land Use Change: Bridging the Gap between Policy and Research in Southeast Asia*. A special issue of Agriculture, Ecosystems and Environment, Vol. 104/1 (September).

Brooks, T.M.; da Fonseca, G.A.B.; and Rodrigues, A.S.L. (2004). Protected areas and species. *Conservation Biology*. **18**: 616-618.

Cowling, R. M.; Pressey, R.L.; Lombard, A.T., Desmet, P,G,; and Ellis, A.G. (1999). From representation to persistence: requirements for a sustainable system of conservation areas in the species rich Mediterranean - climate desert of southern Africa. *Diversity and distributions* **5**: 51-71.

DAI/USAID (2005). Post – Tsunami water resource scoping study in Nanggroe Aceh Darussalam, Indonesia (DAI, Jakarta).

Deschamps, V. (2004). Feasibility study on the rehabilitation of mangroves through Carbon Sequestration in Berau District, East Kalimantan. (Nature Conservancy & Unocal Foundation , Jakarta).

Dudley, R.G. (2005). A generic look at the payment for environmental services: plan or scam? Unpublished Report.

FORKAMI (2006). Laoran Bulan III, Hydrology and geohydrology Survey G. Gede Pangrango & G. Pangrango – Tangkubang Perahu (prepared for ESP, Jakarta).

Foreman, R.T.T (1995). Land Mosaics: The Ecology of Landscapes and Regions (Cambridge University Press, Cambridge).

Forman, R.T.T. and Collinge, S.K. (1996). The 'spatial solution" to conserving biodiversity in landscapes and regions. Pp. 537-568. *In* (eds R. M. De Graaf & R. I. Miller) *Conservation of faunal diversity in forested landscapes*. (Chapman & Hall).

Friday, K.S; Drilling, M. E and Garrity, D.P.(1999) Imperata *grassland rehabilitation using agroforestry and assisted natural regeneration* (International Centre for Research in Agroforestry, Southeast Asia regional research programme, Bogor).

Hutton, J., Adams, W.M. & Murombedz , J. C. (2005). Back to the Barriers?
Changing Narratives in Biodiversity, *Nupi Forum for developmental Studies No.2 December 2005.*

IUCN - The World Conservation Union. (1997): Resolutions and Recommendations: World Conservation Congress. 12-23 October 1996, Montreal, Canada.

Jennings, S. et al. (2003). The high value conservation forest toolkit, 2003 (Proforest, Oxford).

Kushardanto, H; and Idham Arsyad, I. (2006) Pride Campaign Manager Selection Trip Report to ESP, Jogjakarta: 14-17 March 2005
Laumonier, Y. (1997). *The vegetation and physiography of Sumatra* (Kluweer Academic Publishers: Dordrecht/Boston/London).

Lesslie, RG, and Maslen, M., (1995). National Wilderness Inventory: Handbook of Principles, Procedures and Usage, 2nd edition, Australian Heritage Commission, www.rpdc.tas.gov.au/soer/source/668/index.php

MacKinnon, J. R. Smiet, A.C. and Artha, , M.A.(1982). *A national conservation plan for Indonesia: III. Java and Bali.* (FAO, Bogor).

MacKinnon, J.R. and McKinnon, K.S. (1986). *Review of the protected area system in the Indo-Malayan Realm* (IUCN, Cambridge).

MacKinnon, K.S., Hatta, H. Halim and Magalik, A. (1996). *The Ecology of Kalimantan* (Periplus Editions).

Manan, A. and Ibraham, M. (2003). Community-based river management in Southeast Sulawesi, Indonesia: a case study of the Bau-Bau River. Water Science Technology. **48**(7):181-90.

Nijman, V. (2003). Distribution, habitat use and conservation of the endemic Chestnut-bellied Hill-partridge (*Arborophila javanica*) in fragmented forests of Java, Indonesia. *Emu Austral Ornithology* 103(2) 133 – 140.

Noerdjito, M. and Maryanto, I. (Eds) (2001)**.** *Jenis jenis hayati yang dilindungi perundang-undangan Indonesia.* (Bidang Zoologi Puslit Biologi, LIPI/The Nature Conservancy/USAID, Cibinong).

Oates, J.F. (1999). *Myth and reality in the rainforest: How conservation strategies are failing in West Africa* (University of California Press, Berkeley)..

Olsen, D. M. and Dinerstein, E. (2000). The global 200: a representation approach to conserving the Earth's most valuable ecoregions. *Conservation Biology* **12**: 502-515.

Partomihardjo, T. and Ubaidillah, R. (2004). Daftar jenis flora dan fauna Pulau Nusakambangan Cilacap- Jawa Tengah (LIPI, Bogor). Pp.75.

Proctor et al. (1983). Ecological studies in four contrasting lowland rainforests in Gunung Mulu National Park, Sarawak I. Litterfall, forest environment, structure and floristics. *Journal of Ecology* **71**:237-260.

Purwanto, E. (1999). *Erosion, sediment delivery and soil conservation in an upland agricultural catchment in West Java, Indonesia: a hydrological approach in a socio-economic context.* (Academisch Proefschrift, Universitiet de Boelelaan).

Purwanto, E. (2004). *Krisis air di Jawa: menggalang kepedulian hulu-hilir dalam restorasi ekosistem Pulau Jawa.*

Rombang, M.W. and Rudyanto (1999). *Daerah penting bagi burung Jawa dan Bali* (PKA/ Birdlife international – Indonesian Programme, Bogor).

Rhee, S.; Kitchener, D. J.; Brown, T.; Merrill, R.; Dilts, R. and Tighe, S. (2004). Report on the biodiversity and tropical forests in Indonesia: submitted in accordance with foreign Assistance Act sections 118/119. (USAID/Indonesia, Jakarta).

Suyanto, S., Leimona, B., Permana, R. P. and Chandler, F. J. C. (2005). Review of the development environmental service market in Indonesia (ICRAF, Bogor).

Sriyanto et al. (eds) (2003). Guidebook of 41 National Parks in Indonesia (Ministry of Forestry GOI, UNESCO & CIFOR, Jakarta).

Taylor, B. (1998). *An Introductory Guide to Adaptive Management. Ministry of Forests. Canada.*

The Nature Conservancy (2000). *Designing a geography of hope: a practitioners handbook to ecoregional conservation planning*. Vol. I. Second Edition (The Nature Conservancy, Washington).

Thomas, L, Middleton J. and Phillips, A. (2003). *Guidelines for management planning of protected areas*. (IUCN, Gland Switzerland and Cambridge, UK). Pp.79.

Terborgh, J. (1999). *Requiem for Nature* (Island Press/Shearwater Books, Washington DC).

USAID /ARD (2005). *Biodiversity Conservation: a guide for USAID staff and partners, September 2005* (USAID & ARD, BIOFOR).

Vreugdenhil, D. et al. (2003). Comprehensive protected areas system synthesis and monitoring. Vth World Parks Congress, Durban, South Africa, September 8-17.

Whitmore, T.C. (1984). Tropical rain forests of the Far East 2nd Ed (Clarendon, Oxford).

Whitten, A.J., S.J. Damanik, J. Anwar and N. Hisyam (2000). *The Ecology of Sumatra* (Gadjah Mada University Press: Yogyakarta).

Winrock International (2004). Financial Incentives to Communities for Stewardship of Environmental Resources feasibility Study. Report to USAID, Washington DC, USA, 30 November 2004.

Wunder, S. (2005). Payment for Environmental Services: some nuts and bolts. CIFOR Occasional Paper No. 42.

World Bank (2001). *Indonesia: Environment and Natural Resource Management in a Time of Transition*. Washington, DC: World Bank.

7. APPENDICES

APPENDIX I. MATRIX OF CRITERIA RANKS TO PRIORITIZE WATERSHEDS FOR ESP ACTIVITIES IN CENTRAL JAVA IN 2006.

This matrix based on criteria selected to indicate value of watersheds for i) Conservation of biological values and natural resources; ii) society, productive activities and use of water; and iii) Water mgmt & allocation for the watersheds: A, Sengkarang; B, Bodri; C, Garang; D, Progo; and E, Opak Oyo. Upper watershed areas taken as the higher 30% of the contained river basin. *, Note that loading factors are higher for criteria that directly reflect conservation values- rather than those that are proxies. **, Note that by averaging loadings for each of the main Criteria #1, #2 &#3, each of these criteria subsets will contribute equally to the final Watershed Priority Rank. If this is not done, then the major subsets i), ii) and iii) of criteria with the highest number of indicators will be weighted and so contribute more to the final watershed priority ranks.

When reading the priority ranks in this table, note that many are the reverse of the situation in the field because they rank negatively. For example Progo watershed has more volcanic activity than the other watersheds listed, but it has the lowest rank score.

#	Criteria description	Ranking (R) info.	*Loading Factor (LF)	Watershed Priority Rank: [R x LF****]				
				A	B	C	D	E
1. Upper watershed (UW)biological & NR values								
1.1	*Presence of Forest Dept reserves*	3, high 2, moderate 1, low	2	4	2	2	2	4
1.2	*Presence of PHPA PAs*	3, >2 sig. areas 2, 1-2 sig. 1, < 1 sig.	3	3	3	3	9	6
1.3	*Presence of critically, endangered, endangered and vulnerable IUCN redlist spp.*	3, >10 spp present 2, 3-10 spp 1, ,3 spp	4	8	4	4	12	8
1.4	*Presence of Ramsar sites (RS)*	3, 1 in river basin 2, 1 near river basin 1, 1 closer than 30 km	4	-	-	-	-	-
1.5	*Presence of World Heritage(WH) sites*	3, 1 in river basin 2, 1 near river basin 1, 1 closer than 30 km	4	-	-	-	-	-

1.6	*Presence of man & Biosphere(MB) sites*	3, 1 in river basin 2, 1 near river basin 1, 1 closer than 30 km	4	-	-	-	-	-
1.7	*Presence of Biodiversity Hotspots(HS)*	3, 1 in river basin 2, 1 near river basin 1, 1 closer than 30 km	4	12	12	12	12	12
1.8	*Presence of important bird areas (IBAs)*	3, 3 IBAs 2, 2 IBAs 1, 1 IBAs	4	8	8	8	8	8
1.9	*Habitat variety (number of ESP vegetation types)*	3, >8 ESP types 2, 4-8 ESP types 1, ,4 ESP Whitten types	3	6	9	6	6	6
1.1	*Forest vegetation cover present*	3, >20 % 2, 10-20% 1, ,10&	3	9	6	3	3	3
1.11	*Climatic zones present*	3, 3 zones 2, 2 zones 1,1 zone	1	2	2	2	3	2
1.12	*WS area of high erosion risk (from Fig3.17 Whitten et al 1996*	3, <,50% 2, 50 -70% 1, >70%	3	6	6	3	9	6
1.13	*Earthquake danger zone*	3, low 2, moderate 1, high	1	3	3	3	3	3
1.14	*Tsunami danger zone*	3, low 2, moderate 1, high	1	3	3	3	3	3
1.15	*Volcanic danger zone*	3, low 2, moderate 1, high	2	6	6	6	2	4
1.16	*River /stream density*	3, high 2, moderate 1, low	1					
1.17	*River/stream node density*	3, high 2, moderate 1, low	1					
1.18	*Infrastructures: dams, roads, villages, factories*	3, few 2, moderate 1, many	1	3	2	1	2	2
Upper watershed biological & NR total rank values **(T)** . (Sum 1.1 to 1.18 for each watershed rank column)				73	66	56	74	67
Upper watershed biological & NR values: average ranked values (T**/ number of indicator criteria) = **X**				**5.62**	**5.08**	**4.31**	**5.69**	**5.15**

2. Society, productive activities & use of water								
2.1	*Conflicting developmental issues (zones /focal areas)*	3, few 2, moderate 1, high	2	6	4	2	2	4
2.2	*Conflicting social issues (zones/focal areas)*	3, few 2, moderate 1, high	1	3	2	1	1	3
2.3	*Cross boundary issues (zones/focal areas)*	3, few 2, moderate 1, high	1	3	3	2	2	3
2.4	*Incidence of water borne or water related disease(diarrhea/skin disease)*	3, high 2, moderate 1, low	4	4	8	12	4	4
2.5	*Poverty levels/ incidence of malnutrition*	3, high 2, moderate 1, low	3	6	9	3	6	6
2.6	*Incidence of contagious diseases (TBC/ hepatitis polio/typhus/influenza etc)*	3, high 2, moderate 1, low	4	4	4	12	4	4
2.7	*Large- scale illegal logging activities*	3, low 2, moderate 1, high	4	8	4	12	12	8
2.8	*Illegal timber, fauna & flora smuggling activities*	3, low 2, moderate 1, high	1	3	3	1	3	2
2. 9	*Impact of hazardous forest fires (many spots & single large)*	3, low 2, moderate 1, high	2	6	4	6	6	6
2.10	*Environmental management conflicts*	3, low 2, moderate 1, high	2	6	4	2	6	2
2.11	*Target population density*	3, high 2, moderate 1, low	4	4	8	12	8	12
2.12	*Accessibility to implement programs(infrastructure, communication logistics)*	3, high 2, moderate 1, low	1	2	2	3	3	3
2.13	*Existing programs for collaboration*	3, many 2, moderate 1, low	4	8	8	12	8	8
2.14	*Potential private sector support for mgmt of biodiversity & N.Resources*	3, high 2, moderate 1, low	2	2	2	4	2	2
2.15	*Presence of other current USAID projects*	3, high 2, moderate 1, low	4	4	4	4	4	4
2.16	*Receptivity of all levels of government, non-govt or LSMs to cooperate with ESP*	3, high 2, moderate 1, low	4	12	12	12	12	12

2.17	*Land tenure problems (ownership of traditional lands/land re-claiming-squatter's rights)*	3, few 2, moderate; 1, many	4	8	8	4	8	4
2.18	*Quality of spatial plans (e.g., RTRW &RTRWD)*	3, good 2, moderate 1, poor	3	6	6	6	6	6
2.19	*Multi- stakeholder participatory process to develop spatial plans*	3, good 2, moderate 3, poor	3	6	6	6	6	6
2.20	*Stakeholder respect for spatial plans*	3, high 2, moderate 1, low	4	8	8	4	8	8
Society, production activities & use of water total rank values **(T)**. (Sum 2.1 to 2.20 for each watershed rank column)				109	109	120	111	107
Society, production activities & use of water average ranked values (**T**/ number of indicator criteria) = **Y**				**5.45**	**5.45**	**6**	**5.55**	**5.35**
3. Watershed management & allocation for watersheds								
3.1	*Flood regime*	3, rare 2, moderate 1, frequent	2	6	4	2	2	2
3.2	*Past extreme flooding event damage*	3, little 2, moderate 1, high	2	6	2	2	2	4
3.3	*Quality of water in major PDWAM &PLN intakes*	3, high 2, moderate 1, low	4	12	8	8	12	4
3.4	*Overall water debit*	3, high 2, moderate 1, low	4	8	8	12	12	4
3.5	*Large scale irrigation schemes*	3, high 2, moderate 1, low	3	6	6	3	9	3
3.6	*Large scale competitors for water resources.*	3, many 2, moderate 1, few	1	1	1	2	1	1
3.7	*Area of conventional flood zones*	3, small 2, moderate 1, large	1	3	2	3	2	2
3.8	*Area of flash flood zones*	3, small 2, moderate 1, large	2	4	4	2	6	6
3.9	*Waste water treatment priority locations*	3, many 2, moderate 1, low	4	4	4	12	4	8
3.1	*Potential high ground water supply locations*	3, few 2, moderate 1, many	4	8	12	4	12	8
3.11	*Community water supply plan*	3, available 2, in preparation 1, none	1	1	1	1	1	1

3.12	*Surface & ground water degradation*	3, low 2, moderate 1, high	3	6	6	3	6	3
3.13	*Solid waste hazards*	3, low 2, moderate 1, high	2	6	6	2	4	2
3.14	*Toxic contamination*	3, low 2, moderate 1, high	3	3	6	3	6	6
3.15	*Open cast mining & quarrying*	3, low 2, moderate 1, high	2	6	2	2	2	4
Watershed management & allocation for watersheds total rank values **(T)**. (Sum 3.1 to 3.15 for each watershed rank column)				73	72	61	74	67
Watershed management & allocation for watersheds average ranked values (**T**/ number of indicator criteria) = **Z**				**5.33**	**4.80**	**4.07**	**5.40**	**3.87**
Overall Priority Watershed Index = **X+Y+Z**				**16.40**	**15.33**	**14.37**	**16.64**	**14.37**
Watershed priority ranking				**2**	**3**	**4.5**	**1**	**4.5**

ENVIRONMENTAL SERVICES PROGRAM
Ratu Plaza Building, 17th. Fl.
Jl. Jend. Sudirman No. 9
Jakarta 10270
Indonesia

Tel. +62-21-720-9594
Fax. +62-21-720-4546

www.esp.or.id