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缔约方会议

科学和技术委员会

第七届会议

2005年10月18日至20日，内罗毕

临时议程项目12(a)

科学和技术委员会的工作方案

优先问题：国家缔约方提交的关于解决土地退化、脆弱性和复原问题的最佳做法和研究的案例综合报告：综合办法

秘书处的说明

内容提要

为更明确设法采用综合办法的必要性，对与土地退化、脆弱性和复原有关的各种问题进行了讨论。而且，分析了沙漠化问题的现状和研究工作的重要性。由于干旱土地的高度脆弱性和人类行为对生态系统平衡的影响，紧迫需要改善对土地和水的管理。监测和评估土地退化情况需要进行很多跨学科工作，从而综合研究生物物理和社会经济参数。

会议强调了涉及当地社区的参与性办法的一些要点对加强所有权和行动的长久成功的重要性。与其他环境公约的协同作用被认为对加强综合解决与退化土地复原有关的问题十分重要。

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导 言

1. 在第 20/COP.6 号决定中，缔约方会议决定，第七届会议将进一步讨论科学和技术委员会(科技委)第六届会议处理的专题“土地退化、脆弱性和恢复：综合办法”。

2. 在同一项决定中，缔约方会议鼓励各缔约方提交案例研究报告，其中要说明与上述主题有关的最佳做法和创新性研究，同时考虑到科技委及其专家组的意见。所提交报告应当简短，并在不迟于下届会议之前四个月内提交秘书处。缔约方会议还请秘书处通过科技委专家组与科技委协商，从各缔约方提交的资料中选出三或四个具有代表性的案例研究报告。选出的代表性案例研究报告应当由有关缔约方在科技委第七届会议上宣讲。

3. 秘书处已收到缔约方提交的关于这一项目的七个报告。其中四个报告是在科技委第六届会议之前收到的，三个是在科技委第七届会议之前收到的。选出的四个报告被纳入本文件。缔约方向秘书处提交的所有报告都按原样全文转载于《联合国防治荒漠化公约》的互联网站：<http://www.unccd.int/cop/cop7/CSTsubmissions.php>。

委员会可能采取的行动

4. 为便于科技委讨论，秘书处为科技委第六届会议准备了一个背景文件，题为“土地退化、脆弱性和复原：综合办法”(ICCD/COP(6)/CST/2)。科技委在其第七届会议上也不妨审议这一文件，因为缔约方会议在其第六届会议上决定由委员会在其第七届会议上进一步讨论这一优先问题。

5. 提出供委员会审议的这些报告介绍了关于用综合办法解决土地退化问题的具体经验和建议。将请有关国家缔约方代表宣讲报告，之后，委员会不妨视情况提出必要的建议。

Annex¹**SELECTED SUBMISSIONS RECEIVED FROM COUNTRY PARTIES****I. BELARUS**

Belarus became a Party to the UNCCD only in 2001, but even prior to that the country had been actively involved in the conservation of land resources and combating land degradation. The results of the work are summarized in the first national report on the implementation of the UNCCD presented at CRIC 1, Rome, Italy, 2002.

Belarus has implemented an integrated approach in tackling the social, economic and environmental issues relating to the prevention of land degradation, conservation and sustainable use of land resources, which is focused on the following sectors: rural development, forestry and drained lands.

- Over the past few years, 372,000 ha of arable lands (about two per cent of the country's territory) have been converted into pasture and forestlands.
- Even though commercial wood production makes up a significant component of the national economy, with supply running high enough to meet both internal and external demand, the country has seen a steady expansion of forestlands over the past twenty years. Today, forests cover 37.8 per cent of Belarus' territory.
- Land drainage poses a particular threat to sustainable use of land in Belarus. More than 3.4 million ha of land was drained during the 1960s-1980s, which makes up 16.4 per cent of the country's area. Out of this number, about 1 million ha were wetlands, which brought about a number of negative ecological problems, such as peat mineralization, augmented land degradation, more frequent draughts and early frosts, disruptions in the hydrological regime, etc. The situation in the Belarusian Polesie is particularly critical, where more than 40 per cent of wetlands were drained.

In this regard, renaturalization and rehabilitation of drained lands is viewed as an urgent issue to be addressed through the integrated approach toward conservation and wise use of land resources, prevention of land degradation and sustainable rural development.

To highlight the problem, a United Nations Development Programme/Global Environment Facility (UNDP/GEF) project on renaturalization of degraded peatlands is being realized in Belarus. The project can be viewed as a pilot effort in Central and Eastern Europe. Its results will serve as a good example of the application of an integrated approach to land degradation and rehabilitation. The preparatory A stage is currently under way, aiming to prepare a mid-sized GEF project application and to seek co-funding toward the implementation stage; thus, the support of the international conservation community, the UNCCD secretariat and developed country Parties to the UNCCD is crucial for the projects implementation in Belarus.

¹ Reproduced as received by the secretariat without formal editing.

Taking this opportunity, we would like to express our gratitude for your assistance. We look forward to our continuous collaboration on the important issues leading towards the implementation of the UNCCD.

Project identifiers:	
1. Name of the project: Renaturalization and sustainable management of peatlands in Belarus to mitigate climate change, combat land degradation, and ensure conservation of globally valuable biodiversity	2. GEF implementing agency: UNDP
3. Country in which the project is being implemented: Republic of Belarus	4. Country eligibility: <ul style="list-style-type: none"> • Notification of participation in the restructured GEF on 30 March 1994 • Ratification of the United Nations Framework Convention on Climate Change (UNFCCC) on 9 August 2000 • Ratification of the Convention on Biological Diversity (CBD) on 8 September 1993 • Accession to the UNCCD (President's Decree No. 393 dated 17 July 2001)
5. GEF focal area(s): Climate change, biodiversity	6. GEF operational programme/short-term measures: Integrated ecosystem management, Operational Programme 12
7. GEF national operational focal point endorsement: Letter of support from the operational focal point No. 06-19/3521 dated 6 September 2001	

Project linkage to national priorities, action plans and programmes

14.2 per cent of Belarus is covered by peatlands, compared to approximately 3.4 per cent for the planet as a whole. Large-scale drainage during the Soviet period decreased the number of natural peatlands by more than half. Peatlands, once degraded, contribute to progressive loss of productivity and declining harvests, disruptions to the carbon cycle, shrinking habitats for globally important species, and increased risk of fire overall, which in the Chernobyl zone has implications for the spread of radioactive contamination. With about 290,000 ha of degraded peatlands (209,500 extracted peatlands and 78,200 ha of ineffectively used agricultural peatland areas) potentially suitable for rehabilitation, Belarus considers renaturalization of peatlands its highest priority. Ecological rehabilitation of degraded ecosystems has been highlighted as a priority in the National Strategy for Sustainable Development of Belarus adopted by the Council of Ministers of Belarus in March 1997.

The National Climatic Programme (1999), which followed the adoption in May 1997 of the Law of the Republic of Belarus on Protection of the Atmosphere, confirms the Government's commitment to develop and employ measures to terminate mire drainage and reconvert extracted

peatlands to their natural conditions with the aim of enhancing their role in carbon sequestration and assisting the country to fulfil its obligations under the UNFCCC. Partners to the continued in-country dialogue on accession to the Kyoto Protocol acknowledge the important sink function of natural wetlands, as well as degraded ecosystems that may be restored, allowing the country to derive benefit from participation in the Joint Implementation and Emissions Trading Mechanisms once the Kyoto Protocol is acceded to and enters into force.

Upon accession to the UNCCD (2001) the Government of Belarus has, in its first national report to the secretariat, indicated its intention to develop and implement, as part of its overall Convention National Action Programme, a special programme component for rehabilitation and sustainable management of degraded peatlands, these being by far the core type of lands targeted under the UNCCD in Belarus. The first national report states that the formulation and implementation of the National Action Programme to Combat Land Degradation will be coordinated with the National Strategy on Climate Change (2002), currently being formulated, as well as with the National Strategy and Action Plan for Conservation and Sustainable Use of Biological Diversity (adopted 1997). The national report acknowledges linkages between land degradation on the one hand and agriculture and peat extraction on the other. It calls for economic means to be introduced to resolve land degradation caused by economic activities. The UNCCD National Action Programme will be developed by the Government in direct cooperation with the UNCCD secretariat. The medium-sized project proposed here will serve both as an input to the action programme, and as its principal expression.

As a collateral benefit, the proposed project, through incremental cost-funding, will contribute to the following priority programmes of the Government of Belarus:

- The component on renaturalization of extracted peatlands of the State Programme of Protection and Rational Use of Lands (passed by the Cabinet of Ministers in 1994)
- The subprogramme on rehabilitation of disturbed ecosystems as a means to reduce overall damage to the environment, as well as preserve specific habitats, of the National Programme of Rational Use of Natural Resources and Environmental Protection for 2001–2005 pending adoption
- The component on renaturalization of degraded ecosystems in order to optimize the national protected area network and contribute to conservation of threatened biodiversity of the National Strategy and Action Plan for Conservation and Sustainable Use of Biological Diversity of Belarus (adopted by the Council of Ministers in June 1997)
- Increased protection for fire-prone areas in the Chernobyl zone, envisaged by the National Programme to Cope with the Consequences of the Chernobyl Nuclear Power Plant Catastrophe, 2001-2005, and until 2010.

The proposed project will also assist the Government of Belarus in fulfilling its Ramsar Convention on Wetlands obligations, in Operational Objective 2.6: Identification of wetlands in need of restoration and rehabilitation and carrying out of necessary activities.

Project rationale and objectives

Rationale

Peatlands have been globally recognized as one of the most valuable and at the same time most threatened types of natural habitats. Belarus is a country with a substantial share of peat- and non-peat wetlands (14.2 per cent of the country is covered by peatlands, compared to 3.4 per cent for the globe on average). The overall area of natural peatlands in Belarus before drainage (1950) was 2,939,000 ha. As a result of large-scale drainage between 1950-1990, more than 40 per cent of peatlands were drained. Of the 1,303,000 ha of anthropogenically transformed peatlands, as at 2001, about 963,000 ha (74 per cent) were used in agriculture and 279,000 ha (24 per cent) for peat extraction, with the remaining fraction (two per cent) not related to any category. Fortunately, about 1,700,000 ha of peatlands have still remained in their natural state, but many of these have disturbed hydrological regimes and can become a subject for the proposed intervention.

Agricultural land productivity rose greatly in the first several years after drainage. For example, 75-85 per cent of all ripe and green forage was produced on the drained peatlands. Extraction of peat as a fuel was also very intensive. However, the situation has changed dramatically in the last decade. Agricultural use of drained peatlands is no longer as productive as it once was. Several continuous years of exploitation brought about a significant decline in harvest on a large share of the drained peatlands. Repeated use of these areas for agricultural purposes required the introduction of fertilizers and implementation of complex mechanisms to regulate the water regime, which led to over-drying of many lands. In the peat-extraction industry the total area of those peatlands that have been almost fully extracted and subsequently abandoned has risen dramatically.

Impact of degraded peatlands on environment

The use of 10 billion m³ of peat in both agriculture and energy has resulted in the release of huge volumes of CO₂ into the atmosphere, contributing substantially to emissions of greenhouse gases in Belarus. The degraded peatlands continue to contribute greenhouse gases into the atmosphere through rapid mineralization of the remaining peat layer, and certainly the overall carbon sequestration for Belarus from wetlands has fallen dramatically in recent decades, with this decline continuing into the future and more areas becoming degraded unless strategic and practical decisions are made as to the future of degraded peat areas. According to the estimates of the Institute of Problems of the Use of Natural Resources and Applied Ecology of the National Academy of Sciences, one hectare of a Belarusian drained peatland currently emits 5.5 to 22.0 tons of CO₂ annually during its continued mineralization. According to official statistics, there are currently 290,000 ha of degraded peatlands in Belarus, and this number is expected to grow rapidly every year as drained peatlands suffer increasing contraction, deflation and mineralization.

The share of peat as an energy source has been decreasing over time with the depletion of peat deposits. Although the promotion of local and renewable energy sources is given high priority by the energy policy until 2015, their total share is only about 14 per cent (5 Mtoe) of the total energy balance. The bulk of the balance is still dominated by traditional energy sources

most of which are imported from the Russian Federation (natural gas, oil and coal). The use of peat for energy production under the current conditions of declining peat extraction is expected to stay around 1 Mtoe per year. The decline in peat extraction is expected to be compensated for by the rising utilization of wood and wood waste. The UNDP/GEF BYE/00/G42 project, currently under preparation (PDF B stage) aims at reducing barriers to large-scale utilization of wood and wood waste in district heating.

One of Europe's critical environmental concerns is preservation of the organic layer of drained peat soils, the depth of which falls each year by 1-2 cm due to contraction, mineralization and deflation. Destruction of the peat layer gives rise to a number of negative processes on areas adjacent to the drained lands. These results in reduced flow or desiccation of smaller rivers and water channels, the disappearance of valuable vegetation associations, changes in the micro-climate, and increases in eutrophication of rivers and lakes. Drainage of peatlands has led to a significant drop in the groundwater table locally and regionally, an increase in soil erosion, an increase in the runoff of nutrients into natural water bodies and ground water aquifers, and other forms of land degradation. Annually about 1.5 million tons of mineral and up to 700,000 tons of aggressive water-soluble organic substances originating from drained peatlands flow into the Black Sea through the Pripyat and the Dnieper. The drainage programme of the Soviet period paid little heed to ecological sustainability and nature-conservation. As such, the subsequent destruction of natural habitats and the rise in the intensity of economic activities led to a substantial decline in the populations of many plant and animal species, especially water birds, primarily as a function of the habitat destruction. Peatlands drainage is a direct cause of biodiversity loss at both species and habitat levels:

- On the species level the following SPEC I and II bird species² were affected by habitat loss as a result of peatland drainage: Greater spotted eagle *Aquila clanga*. Corncrake *Crex crex*. Great snipe *Gallinago media*, Aquatic warbler *Acrocephalus paludicola*. The large-scale drainage resulted in the disappearance of 11 plant species in Belarus. Thirty-three species of the European Red List of Threatened Plants shrank considerably in their population size, including *Caldesia parnassifolia*, *Carex davalliana*, *Carex heleonastes*, *Cladium mariscus*, *Coeloglossum viride*, *Corallorhiza trifida*, *Cypripedium calceolus*, *Cypripedium guttatum*, *Dactylorhiza baltica*, *Dactylorhiza fuchsii*, *Dactylorhiza incarnata* and *Gymnadenia conopsea*. As the share of extracted and abandoned peatlands grows, populations of the threatened plants continue to decline. According to the estimates of Belarusian scientists, large-scale renaturalization of extracted and abandoned peatlands would permit a rapid increase in the population sizes of such rare plants as *Angelica palustris*, *Bistorta major*, *Betula humilis*, *Carex heleonastes*, *Empetrum nigrum*, *Glyceria declinata*,

² Species of European Conservation Concern (SPECs):

Category 1 Species of global conservation concern because they are classified as Globally Threatened, Conservation Dependent or Data Deficient in Birds to Watch 2: *The World List of Threatened Birds* (Collar et al., 1994)

Category 2 Species whose global populations are concentrated in Europe (i.e. more than 50 per cent of their global population or range in Europe) and which have an Unfavourable Conservation Status in Europe

Category 3 Species whose global populations are not concentrated in Europe, but which have an Unfavourable Conservation Status in Europe

Category 4 Species whose global populations are concentrated in Europe (i.e. species with more than 50 per cent of their global population or range in Europe) but which have a Favourable Conservation Status in Europe.

Oxyccocus microcarpus, *Pedicularis sceptrum-carolinum*, *Polemomum caeruleum*, and *Rubus chamaemorus*.

- Populations of both rare fauna and rare flora declined because the drainage of peatlands had resulted in fragmentation of their formerly continuous habitats. They now occur on the few remaining natural mires and sporadically along the periphery of the anthropogenically damaged sites. Their population numbers are directly related to the habitat area, and rehabilitation of their potential habitats, linking the now segregated sites, will contribute to the stabilization and improvement of the populations of these species in Belarus.
- On the habitat level, most of the above-mentioned species are tied to fen mires. Drainage has decreased the area of natural fens drastically, leaving only some 34 thousand ha of this habitat in its natural state.

Abandoned, desiccated and degraded peatlands contribute to a high danger of fires; annually, from 4,000 to 12,000 ha of drained peatlands and surrounding forests and other habitats are destroyed by fire. The problem is especially critical for the Chernobyl-affected areas, where fires provoke substantial releases of radiation into the atmosphere. This has been one of the key ecological problems indicated by the Government in its State Chernobyl Programme and reiterated in the recent United Nations Chernobyl Report.

The proposed medium-sized project will address peatland degradation in Belarus by aiming to achieve global benefits synergistically in the areas of climate change, land degradation, biodiversity conservation and pollution prevention. Proposed as an OP 12 project, it will address the stabilization of greenhouse gases, the conservation and sustainable use of biodiversity, and land degradation, through a programmatic approach and within the context of sustainable development. The proposed project will build on both national and international experience to introduce wetland renaturalization on degraded peatlands as a mechanism to resolve the decision-making deadlock for degraded peatlands, becoming an economic and political instrument for decision makers and land users and significantly increasing their capacity to deal with renaturalization issues.

Project objectives

The overall goal of the proposed project is to mitigate climate change, prevent land degradation, ensure biodiversity conservation and prevent radioactive pollution by rehabilitating and securing long-term conservation and sustainable use of degraded peatlands in Belarus.

This medium-sized project will build on the national baseline to realize its main objective through three specific components:

- **Strategic Component.** The project will finalize the Programme for Renaturalization of Degraded Peatlands to be included in the National Implementation Action Programme for the UNCCD. The programme will include adoption of economic mechanisms to stimulate the rehabilitation of degraded peatlands, such as subsidization of land conversion for ecological rehabilitation. Alternative sustainable uses for the degraded peatlands (forestry, reservoirs, other) will also be analysed and presented.

- **Validation Component.** Based on the outcomes of the PDF A stage, the project will renaturalize up to eight degraded peatland sites throughout Belarus, with a total area of approximately 14,000 ha. These sites have been selected provisionally. Their suitability as project sites will be confirmed during PDF A implementation. The targeted areas will be those that have the largest potential to stop CO₂ emissions and ensure its sequestration in the future, and the greatest possibilities for contributing to the stabilization and growth of populations of globally important flora and fauna, as well as enlargement of the total area of the unique fen mire habitat. The targeted areas will be moved from under the jurisdiction of the present land-leasing agencies (peat-extracting enterprises and/or collective farms) and transferred to nature conservation categories or forests, with a corresponding release from or reduction in of rent and compensatory payments, under control of the Ministry of Natural Resources and Environmental Protection, whereby new protected areas will be sought to be established or the boundaries of existing protected areas will be redrawn. Management and funding of the newly established protected areas will be the sole responsibility of the State upon project end. This component's main objective is to validate the Peatlands Programme of the National Implementation Action Programme, preparation of which will run in parallel. In terms of global carbon benefits, the validation phase alone will achieve a decrease in CO₂ emissions by at least 100,000 tons annually.³ A 14,000 ha increase in fen mire habitat – the target for the proposed project – will increase the area of fens by 30 per cent, substantially raising the probability of extending and increasing populations of the threatened species. As a collateral benefit, the validation phase will contribute to resolving the problem of peat fires, especially in the Chernobyl-affected zone, where the project will target 2-3 sites.
- **Fine-tuning Component.** This will include establishing an integrated monitoring system for restored peatlands, and continued research into critical issues. This will include continued research into and measurement of the flora and fauna of renaturalized wetlands and of the greenhouse gas sequestration/emissions by the renaturalized peatlands, and will be sustained by Government institutions. National experts in Belarus have acquired a great deal of experience in the assessment of carbon emissions, sequestration potential, methane production and other climate change aspects relating to degraded peat areas. The proposed project will incorporate, apply and expand this research. Special attention in its fine-tuning component will be dedicated to additional research on such issues as methane production in order to make sure that the project is making an overall positive impact in terms of global change.
- **Review of the Environmental Impact Assessment (EIA) for peat extraction** to increase the level of safety of peat extraction in terms of land degradation and biodiversity impacts. To pursue this, the project will adjust the EIA before drainage, so that in addition to those ecological disturbances already present, it focuses substantially on biodiversity conservation and land degradation. It is expected that

³ The estimate is based on the calculations performed by the Institute of Problems of the Use of Natural Resources and Applied Ecology of the National Academy of Sciences, which indicated that one hectare of a Belarusian drained peatland supplies 5.5 to 22.0 tons of CO₂ annually. The average closer-to-the-lower-boundary figure of seven tons was used to estimate that 14,000 ha of renaturalized peatlands will reduce CO₂ emissions by a total (rounded up) of about 100,000 tons annually.

the current methods for extraction of peat could be less damaging to biodiversity and leave less probability of mineralization processes were some simple modifications made to how the extraction is actually performed and what is done when the necessary amount of peat has been extracted.⁴

- Building the technical and operational capacity of institutions and NGOs to rehabilitate degraded peatlands.
- Raising the awareness of the general public and authorities on the issue of peat use, its values, and ways for sustainable management of peat resources for the benefit of the country and the world.

The total project budget, including the increment, is US\$ 5,780,000, which is the overall cost of the alternative. Out of this the requested GEF assistance to cover the increment is US\$ 980,000. The financial ratio is about 1:6.

The duration of the medium-size project is expected to be 4-5 years, to be clarified at the PDF A stage. The overall budget is moderately low; however, sufficient time is needed not only to implement the validation component, but also to allow for proper monitoring to guarantee that the project is on the right track and to recommend the approach for wide-scale replication.

According to the Institute for Problems of the Use of Natural Resources and Applied Ecology of the National Academy of Sciences, the proposed project is the first one in the region that can enable practical realization of the theoretical base for rehabilitation of degraded peatlands with varying genesis, geomorphological structure of peatlands in varying bioclimatic conditions with precipitation to evaporation ratio of 0.9 to 1.3. The theoretical basis has been developed in Belarus as part of the baseline research programmes mentioned in the text. The model (based on best practices, lessons and experience of the project) will be recommended for replication inside Belarus upon project termination. Best practices and lessons learned from the project will be communicated through established exchange channels with neighbouring countries (especially Russia) and will be publicized widely.

Expected outcome

By project end the trend of peatland degradation will be reversed towards peatland rehabilitation, resulting in increased climate, biodiversity and other benefits. Specifically:

Strategic component

- A programme for renaturalization of degraded peatlands and alternative ecologically sound uses will be developed and included in the national implementation action programme under the UNCCD, providing for political and economic mechanisms of decision-making for economically abandoned peatlands.

⁴ For example, such mechanisms as increasing the currently low peat-extraction coefficient from 0.45 to 0.75 using newer extraction technologies with subsequent obligator renaturalization.

Validation component

- A reduction of CO₂ emissions by at least 100,000 tons annually will be achieved.
- Approximately 14,000 ha will be rehabilitated, contributing to expansion of the area of globally valuable fen habitats, with their long-term protection secured.
- Local populations of globally threatened flora and fauna species will be stabilized.
- The risk of fires and radioactive contamination will be diminished significantly.

Fine-tuning component

- The capacity of the country to deal with the issue of ecological peatland rehabilitation will be increased, building on a greater awareness of the values of peatlands and techniques for their wise management.
- EIA for peat extraction will be reviewed for increased safety in terms of land degradation and biodiversity conservation.
- An integrated monitoring system for restored peatlands will be established. Continued data on CO₂ sequestration from peatlands will be available. Research on methane production from degraded and renaturalized peatlands will be strengthened.
- Funding sources for further rehabilitation will have been identified.

II. TURKEY

Referring to decision 20/COP.6, the following case studies and best practices carried out in related fields are considered as useful information for the debate:

(i) Turkey has completed a World Bank supported project entitled “Eastern Anatolia Watershed Rehabilitation Project”. The project broadly addressed the problems of rural poverty and degradation/erosion of natural resources in the eastern region of the country including 11 provinces. The basic aims of the project were to improve the management of forestry, rangeland and agricultural activities in the micro catchments, through preventing and/or mitigating water erosion, and increasing soil productivity and rural incomes in order to maintain the sustainability of resources.

The project was started in 1993 and implemented over seven years. The project might be considered as a pioneer initiative and as a successful case study by considering its outcomes. It has fully taken into account the multi-disciplinary and multi-sectoral dimensions of an integrated approach in the watershed management programme. The following components of this integrated watershed rehabilitation project were successfully carried out and funding realized during the project life cycle in a participatory manner:

- Several Government institutions and NGOs took responsibilities and realized related activities.
- Participation of local people and all related stakeholders were considered key partners in the project.
- Forestry and agricultural sectors have played a key function in all stages of the project.

- It is recognized that local communities and villagers have the key role in watershed rehabilitation programmes.
- Forest plantation, rangeland management and small-scale agricultural entrepreneurs are the most important investment practices in such programmes.
- The successful result of the project and lessons learned should be maintained, sustainable and replaced in other appropriate parts of the country.

(ii) The following projects have been conducted by the Scientific and Technical Research Council of Turkey (TUBITAK) in different fields and should be considered as significant contributions to the implementation of the Convention.⁵

- The project titled “Fuel Cell Technology Development for Clean Energy Production” (2003-2004) aiming at importing the fuel cell technology into Turkey and to develop fuel cell products border to make energy conservation.
- BIOCOGEN (Biomass Cogeneration in Europe), 2001-2003, Energy, Environment Sustainable Development Priority Area. The aim of the project is to determine the potential of the biomass origin fuels, currently usage ratios, biomass cogeneration plants statue.
- The European Union’s 6th Framework Programme projects (2005-2008) aimed at the improving of the S&T research capacity of TUBITAK Marmara Research Centre Energy Systems and Environmental Research Institute (ESERI) in the fields of Integrated Biomass Gasification with Power Technologies has successfully evaluated and just passed the negotiation process with the European Commission (14 February 2005, Istanbul, Turkey). The main goal is to improve the scientific research capacity of the national research centre and to create an excellency centre. There are several activities including increased job opportunities for young researchers, upgrading and renewal of the available S&T equipment, organization of international workshops, involvement of centre staff in EU meetings, provision of advanced training, technical visits, disseminating of information, and improving networking with international researchers in EU Members States and Accession Countries.
- EU-DEEP, 2004-2009 - The birth of a European Distributed Energy Partnership that will help the large-scale implementation of distributed energy resources (DER) in Europe. The EU 6th Framework Programme supported the project. In the project Turkey is represented by the Energy Institute of TUBITAK Marmara Research Centre as one of 39 partners including utilities, research institutions, industry and governmental authorities. DER comply with the European Union directives requiring action on the demand side, improving efficiency, ensuring security of supply of clean energy and completing the development of new sustainable energy generation and transformation technologies, such as renewable energies and fuel cells.

⁵ The Scientific and Technical Research Council of Turkey (TUBITAK) is an umbrella Stated-owned institution which carries out and/or coordinates scientific and technological research studies. Further information can be found on <http://www.tubitak.gov.tr>.

- The project “Exploitation of Agricultural Residues in Turkey” (LIFE 03 TCY/TR/000061) (2004-2006). The overall objective of the project is to strengthen the capacity of Turkey to exploit in a sustainable way the vast potential of agricultural waste residues in the country, aiming at sound environmental, economic and social benefits. More specifically, the project strives to map the exploitable fraction of such residues across the country, create the conditions for a better administrative, legislative and institutional environment for the realization of agricultural waste exploitation projects, create or improve the capacity of the regional administration, improve the business environment by supporting investors and transfer to Turkey the rich EU experience in the field of agricultural waste exploitation policy and technology.

(iii) Apart from the activities and achievements of the related Government institutions, some well-known NGOs have also carried out several promising programmes/projects which may consider valuable contribution to the Convention related challenges at local and national levels in the country. The following are some good practices of such NGOs:

- Turkish Foundation for Combating Erosion, Reforestation and the Protection of Natural Habitats (TEMA)⁶ implements reforestation, afforestation, carbon sequestration and biodiversity protection projects in areas subject to erosion, in order to regain the green cover, wildlife and ecological balance. The foundation, with the support of the Ministry of Environment and Forestry, has planted 2.2 million saplings over an area of 2.350 hectares under 25 different reforestation projects through the sponsorship of individuals and companies.

- TEMA Foundation also contributes to combating soil erosion and creates and implements model rural development projects. Such projects aim to achieve sustainable development while preventing erosion and protecting the environment.

- At present, TEMA works on 35 small-scale rural development projects over the country. As an example the project “Macahel Rural Development Project for the Conservation of Natural Heritage” is implemented by TEMA in the Macahel region. The project aims to create alternative income resources for the local community while protecting nature. The project includes the activities of production and marketing of the Pure Caucasian Bee that thrives naturally in the area and the promotion of eco-tourism and organic agricultural activities.

- Another best practice which was implemented by the Soil Science Society of Turkey (TTBD)⁷, a specialized NGO on soil science, is the project “Assessment of soil degradation and the relation between soil degradation and productivity as well as the planning of the basin for sustainable farming in Celikli Catchment”.

⁶ Turkish Foundation for Combating Erosion, for Reforestation and the Protection of Natural Habitats (TEMA) is a non-profit NGO in Turkey. Further information can be found on <http://www.tema.org.tr>.

⁷ The Soil Science Society of Turkey (TTBD),⁷ specialized NGO on soil science. Further information can be found on <http://www.toprak.org.tr>

(iv) In order to maintain the sustainable use and management of existing rangelands, the first rangeland Law 4342 was put into force in 1998. Through this law:

- Decentralized management and locally based decision-making are promoted.
- Increasing productivity and profitability in the rural livestock activities are considered.
- The better nutrition of people and protection of the environment are paid more attention.

(v) The Forestry Service in Turkey is significantly considers to achieve the sustainable management of the country's forest resources. It has recently taken favourable measures such as:

- Rehabilitation of degraded forests through ten-year Actions Plans. 800,000 ha of degraded forest area was rehabilitated by 2004.
- Protection of Forest Biodiversity is being adapted to administrative unit based Forest Management Plans.
- In the content of expansion of renewable energy resources utilization, forest resources as an efficient energy source, particularly in rural areas, is encouraged and supported.

III. JAPAN/MALI

Republic of Mali The study of prevention of desertification in the South region of Segou	Implementation agency	Ministry of Mines, Energy and Water
	Consultant	Japan Green Resources Corporation
	Project Manager	Naoya Shimizu
	Study period	From March 2000 to July 2003
	Type of study	Master Plan (M/P)

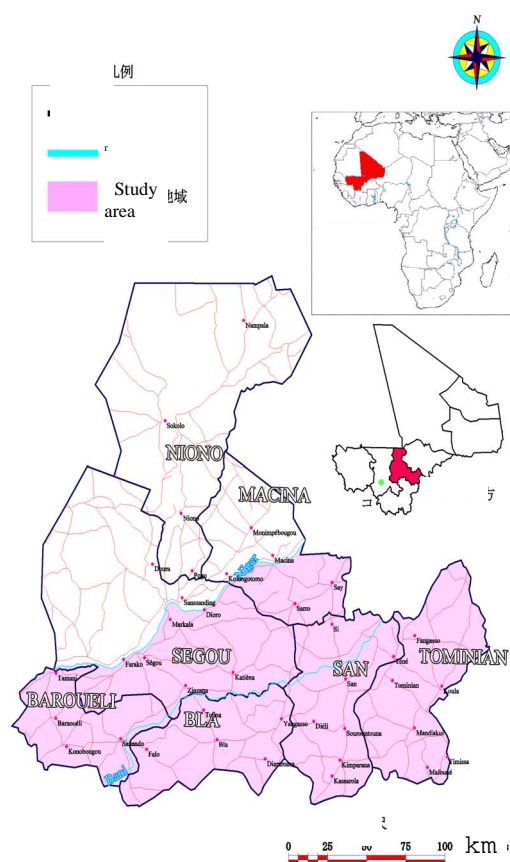
Background of the study

The industrial structure of Mali in 2000 consisted of primary industry (43.4 per cent), secondary industry (17.8 per cent), and tertiary industry (38.8 per cent). The per capita GDP was CFAF 150,000 (approximately US\$ 220); Mali falls into the group of the world's poorest nations. The adult literary rate is estimated to be 31 per cent (*World Bank Fact Book 1995*), and the educational gap between urban and rural areas is wide. The Human Development Index (HDI) established by the UNDP ranked Mali 166th of the world's 174 countries.

As in other countries in the Sahel region, desertification in Mali is accelerating. The UNCCD came into effect in 1994, in response to the growing call for international measures to combat desertification. The UNCCD is a treaty that takes as its basic strategy the bottom-up approach, placing importance on the promotion of residents' participation, in recognition of the fact that the large-scale top-down projects of the past, implemented with an enormous investment of funds, did not achieve the hoped-for results. The Government of Mali, as a signatory of the UNCCD, formulated its National Environmental Action Plan (PNAE) in 1998.

The south region of Ségou, which is the study area covered by the project, is the main farming area of Mali. In the study area, against a background of growing population, the unit crop yield is falling, firewood resources are declining, and pasture resources are insufficient while at the same time desertification is advancing. However, taking into account the fact that annual precipitation in the study area is 600 to 800 mm, with the implementation of comprehensive measures centering on the development of the rural village, this is an area with the potential to prevent desertification through the preservation of the local natural resources on which agricultural production depends. Against this background, the Government of Mali requested the Government of Japan to implement a study to formulate a Master Plan for the prevention of desertification in this area. In December 1999, the Government of Japan dispatched the Preliminary Study Team through the Japan International Cooperation Agency (JICA). The Government of Mali and the Preliminary Study Team agreed to the details of the Master Plan (M/P) to prevent desertification, and concluded the Scope of Work (S/W).

Map of the study area¹



¹ The names of countries/territories, geographic topological names as well as the borderlines presented in this map do not reflect the official standpoint neither of the United Nations nor of the UNCCD.

Objectives of the study

This Development Study was implemented with the following objectives:

1. To formulate the Integrated Rural Development Plan (Master Plan) for prevention of desertification through the development of sustainable agriculture, stock raising and silviculture.
2. To give instruction during the course of the Study to the Mali counterparts and implement the transfer of technology relating to the methodology of the Study and the procedures and guidelines for drawing up the Study plans.

Approach to the formulation of the M/P for prevention of desertification

1. To ensure residents living in the Study Area are able to develop sustainable

agriculture, stock raising and silviculture, and to develop the living infrastructure via which they can engage in these production activities.

2. In order for the residents to recognize the necessity of the activities to prevent desertification and to tackle the activities on their own initiative, it is essential that a system be introduced that allows the local residents to participate voluntarily in all the processes, including the analysis of present circumstances, the selection of countermeasures, and the formulation, implementation and maintenance/operation of programmes at the village level. Residents' participation in these processes will arouse their awareness of ownership and empowerment. To encourage resident participation, the "fostering of residents' awareness of ownership in measures to prevent desertification/voluntary establishment by resident participants of organizations for the implementation of programmes / resident participants' accountability for the operation and management of the programmes" (this chain of methods is called the "Terroir Management Method") will be adopted.

Study area

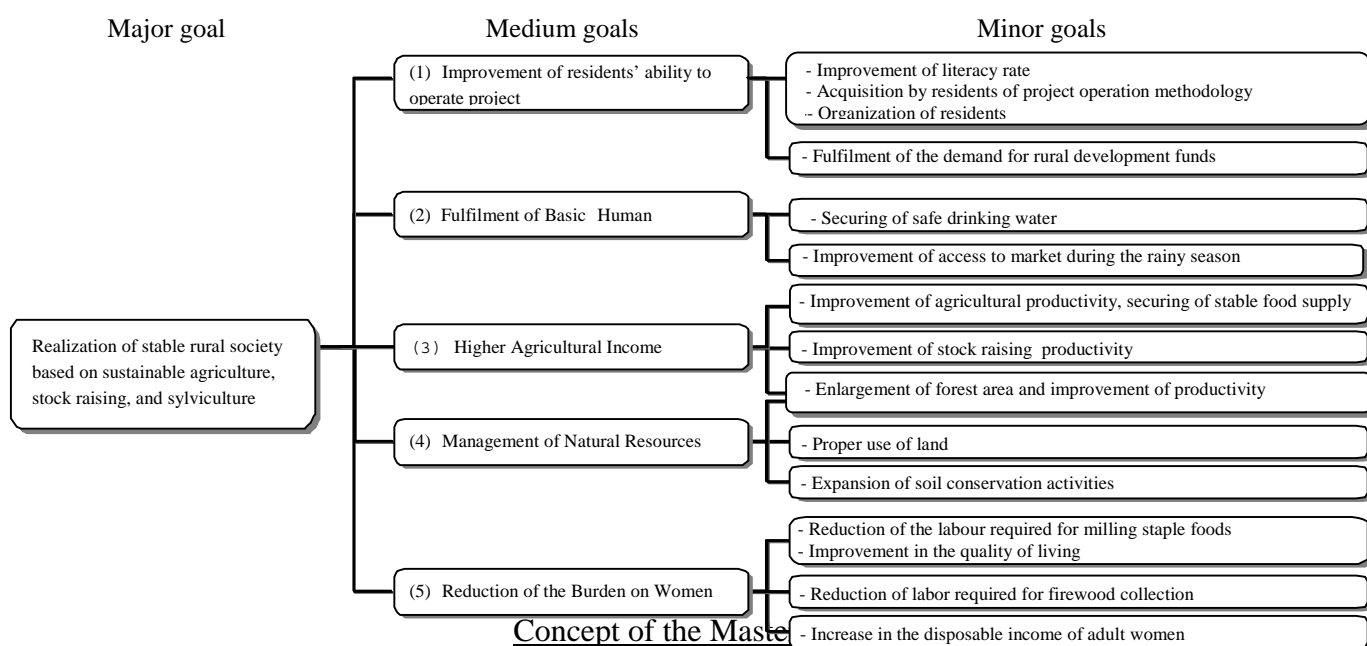
The study area covers 3.3 million ha of the south area of Ségou Cercle, Mali.

The study area has a total population of 1.1 million, and 1,695 villages with a population of over 200.

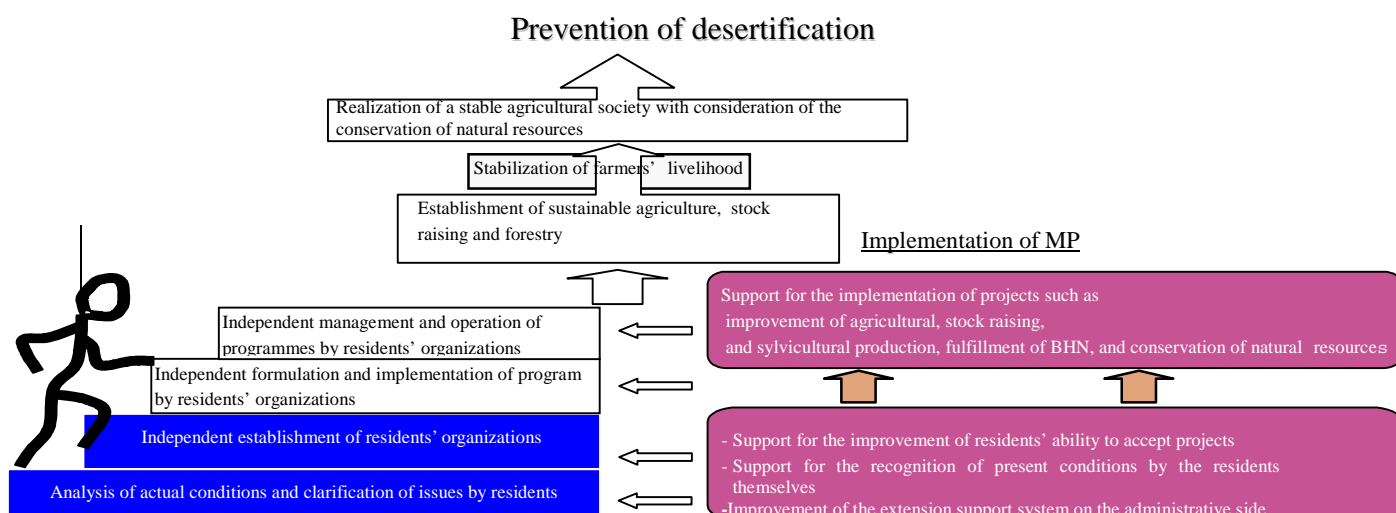
The study area contains all or part of the six Cercles of Baraouéli, Ségou, Bla, Macina, San and Tominian.

Objectives of the Master Plan

The above-mentioned objectives are summed up below.



Concept of the Master Plan



Master Plan basic items

Item	Detailed item	Description
Target year	2025	Planned period of 22 years
Project area	Rain-fed agricultural area	1,159 villages, 2.26 million ha (Study area 3.3 million ha (narrowed down to least developed area))
Development objective	Establishment of sustainable agriculture Improvement and stabilization of farmers' income	Aim to conserve natural resources through development of sustainable agriculture Elimination of poverty, stabilization of livelihood for residents, who are responsible for conservation of resources, are the priority issues
Project operators in M/P	Village level	Terroir Management Committee (residents' organization) and residents who are members of the committee
	Administration level	Project office organized mainly by the National Directorate of Rural Support of the Ministry of Agriculture, Sylviculture and Fishery (the extension workers deployed by the Commune, the smallest administrative unit, are responsible for the direct support of villagers)
Framework of the project	Residents' participation at all stages of the project	Project operation by Terroir Management Committee As a rule, part of project cost is borne by residents
	Establishment and effective use of micro credit	Operation and management by Terroir Management Committee

Principle of residents' contribution

As a general rule, residents shall bear part of the costs for every project, in order to raise residents' awareness of ownership.

Programme item	Type	Residents' burden
Training	Literacy education	Cost of teachers and stationery only
	Other	Cost of stationary
Works of a public nature	Buildings	Provision of simple labour and on-site materials plus 200,000 CFAF per site
	Wells	Provision of simple labour and on-site Materials plus 300,000 CFAF per site
	Structures (such as vaccination stations)	Provision of simple labour and on-site materials plus 150,000 CFAF per site
Projects contributing directly to an increase in farming income	Projects for which the technology is already established in the community	80% of equipment costs
	Projects for which the technology is not fully established	30% of equipment costs
Equipment for common use	Mill, road improvement equipment (carts), etc.	30% of costs

Method for operation of Terroir Management Committee

In this M/P, Terroir Management as the method of promoting resident participation at the village level and is a prerequisite for the implementation of specific activities for the prevention of desertification. The plan is for the Terroir Management Committee to take the lead in the management and operation of activities to prevent desertification. The basic process for implementation of the Terroir Management method is as follows:

1. Mutual trust is fostered between the project implementer (Project Office) and the local residents.
2. Analysis of the present situation by residents on their own initiative, and the raising of an awareness of project implementation among the residents (clarification of what the residents see as problems and what solutions to such problems they consider necessary; this process is implemented through Participatory Rural Appraisal (PRA)).
3. The residents organize the Terroir Management Committee, the main body for the planning, implementation, management and evaluation of each programme to prevent desertification.
4. The project plan is drawn up under the leadership of the Terroir Management Committee (specialist groups are set up in each field as sub-committees under the Terroir Management Committee, in line with the content of the programme).
5. Mutual discussions and agreement on the project plan between the Terroir Management Committee and the project support side.
6. The project is implemented on the initiative of the Terroir Management Committee.

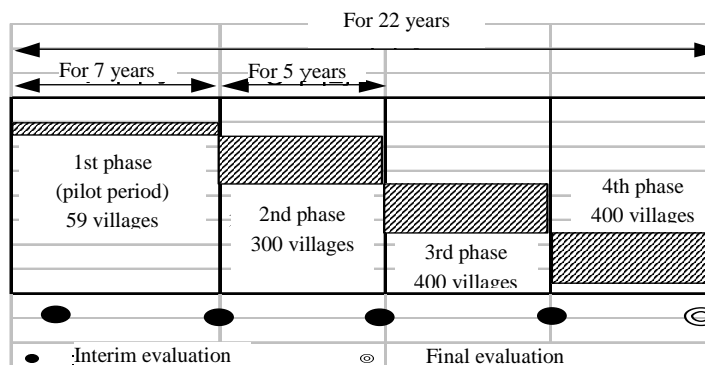
7. Management and evaluation of the project by the Terroir Management Committee is reflected in further project activities.

Note: What is what?

A Terroir is “a spatial area of agricultural land or grassland possessed and used by a certain community, where the community’s ownership and right of use is recognized by other communities in the neighborhood”. The Terroir Management places on the residents all responsibility for the management of the land and resources used by the community through a process of engendering a sense of resident autonomy, and aims for the long-term improvement of the natural and living environments of the Terroir and the enhancement of regional developmental vitality. The term Terroir Management was conceived from the village-level approach of NGOs active in the Sahel region prior to 1984, and gained general recognition when it was adopted as a means of realizing a strategy to combat desertification in the Sahel Region at the Conference to Combat Desertification held in Nouakchott, Mauritania, in November 1984.

Project schedule

The planned projects will be a package for each village unit, and each project package will be implemented over a period of five years. The timetable for the projects is shown below.



Required project costs (million CFAF) 4,842 20,452 27,163 26,859 Total: 79,316

Of the seven years of the first phase shown in the above table, the first two years will be used for the establishment of a project office system and the training of extension workers.

Photos of verification project



Participatory Rural Appraisal survey



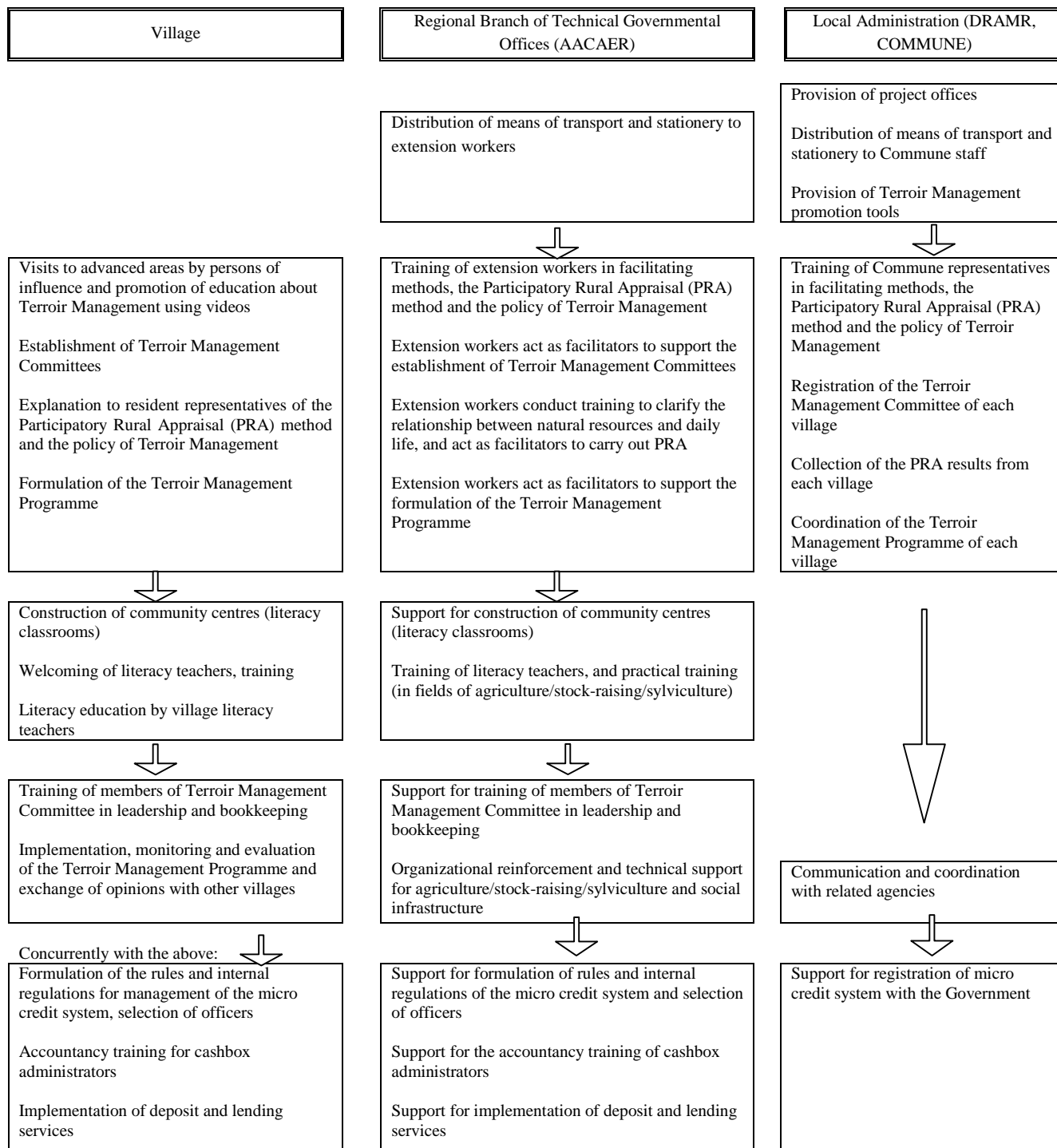
Construction by residents



Literacy classroom

Programme to enhance residents' ability to operate the project

Detailed flow to improve residents' ability to operate the project, on which the M/P is based, is shown below.

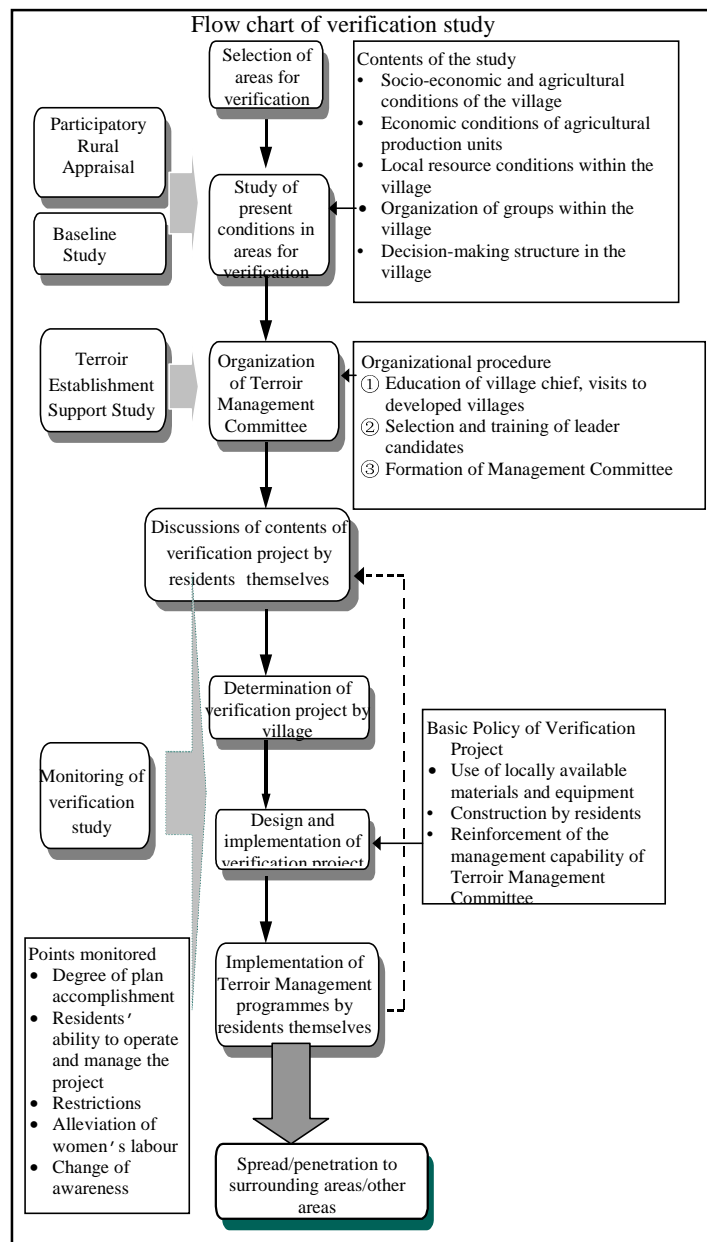


Policy on implementation of verification project

In this study, some of the projects making up the M/P were implemented as model projects and a verification study was carried out in 12 villages in three districts representing the Study Area, in order to feed the results of the evaluation of the appropriateness and feasibility of the projects back into the M/P.

In these verification projects, the organization of residents (establishment of CGTV and determination of project plan by the residents) in the 12 verification villages was completed by the end of 2000. During the period of over two years since then, the verification projects were implemented following the basic concept of resident participation and autonomous implementation of the project by the residents. As at February 2003, most of the projects were operating smoothly under the leadership of CGTV. In some projects, unique measures taken by villages were observed, as well as new developments or an extension of effects to nearby areas. The Study team continued to monitor and evaluate the verification projects throughout the process of their implementation, and the results were reflected in the formulation of the M/P.

Implementation process of verification projects



Considering the low rate of literacy among local residents in the area, visual methods are used as far as possible to discuss the PRA survey with them and to expand educational and awareness-raising activities.

In order to smooth communications and understanding and build a relationship of trust with local residents, the Study Team made efforts to foster and enhance awareness of project implementation through local coordinators deployed in the villages, taking sufficient time to sound out the opinions and intentions of the residents.

Out of respect to local traditions and customs, residents' attention was called to the need for organization for the implementation of programmes via a stepped approach: the existing power organization (village headman and senior membership) → selection of key persons (local leaders) → formation of the leader group.

The visits to developed areas and study of successful cases of the programmes by the key persons and leader groups allowed them to understand the effects and benefits to be gained from implementation of the programmes, thus enhancing resident awareness.

Training in technology and the methodology of organizational operation and management was furnished to the key person and leader groups, in order to improve their ability to implement the project.

In parallel with the above steps, the Terroir Management Committees were organized independently by the residents led by the key person and leader groups. In this case, external support was kept to a minimum, and the Committee was encouraged to select project content and a method of project operation and management that could be realized through the residents' own efforts as far as possible (as a general rule, part of the necessary equipment/material costs and labour were borne by the residents).

The Terroir Management Committee operated, managed and evaluated the project on its own initiative, the results to be reflected in the further continuation of the project.

Results of verification project and reflection in M/P

Project deployment for achievement of M/P objectives	Verification project item	Results/outcome of verification project
<ul style="list-style-type: none"> Establishment of Terroir Management Support System 	<Not implemented as Verification Project>	<Not implemented as verification project>
<ul style="list-style-type: none"> Support for organization of residents 	Support for organization of farmers who operate the project	<ul style="list-style-type: none"> Resident organizations were formed in all 12 verification villages
<ul style="list-style-type: none"> Improvement of literacy rate 	Construction of literacy classrooms and education of literacy teachers	<ul style="list-style-type: none"> 75% of villages conducted literacy education independently
<ul style="list-style-type: none"> Improvement of the residents' ability to implement project 	Training of residents to improve their ability to implement the project	<ul style="list-style-type: none"> All the villages are able to implement projects independently
<ul style="list-style-type: none"> Establishment of small-scale financial system 	Support for establishment of rural banks and subsidies to procure safes	<ul style="list-style-type: none"> Effective use of micro credit in all the villages, loan repayment at virtually 100%
<ul style="list-style-type: none"> Construction of modern wells 	Support for the construction of large-aperture concrete wells	<ul style="list-style-type: none"> Hygienic water sources secured
<ul style="list-style-type: none"> Road construction and repair 	Construction and repair of access roads to markets	<ul style="list-style-type: none"> Elimination of road sections impassable in the rainy season
<ul style="list-style-type: none"> Supply of fertilizers for rain-fed farm products 	Initial investment support for the procurement of fertilizers and improved seeds	<ul style="list-style-type: none"> Increase in cereal yields and in number of farmers purchasing fertilizers and seeds independently
<ul style="list-style-type: none"> Small-scale cultivation of vegetables 	Support for the construction of water sources and vegetable field fences	<ul style="list-style-type: none"> Income of 10,000 CFAF per participant (of which 50% is used to improve residents' nutrition through home consumption)
<ul style="list-style-type: none"> Construction of cereal bank 	Support for construction of rural cereal bank and assistance with initial stock	<ul style="list-style-type: none"> Repayment rate of 70%
<ul style="list-style-type: none"> Construction of vaccination stations 	Support for construction of vaccination stations	<ul style="list-style-type: none"> Vaccination of 70% of livestock in villages in the project
<ul style="list-style-type: none"> Livestock fattening 	Support for fodder production for sheep fattening	<ul style="list-style-type: none"> Income of 10,000 CFAF per head of fattened livestock
<ul style="list-style-type: none"> Construction of improved poultry houses 	Support for construction of improved poultry houses	<ul style="list-style-type: none"> Increase in numbers of poultry kept
<ul style="list-style-type: none"> Introduction of improved fodder plants 	Support for introduction of improved fodder plant seeds	<ul style="list-style-type: none"> 29 ha were planted but poorly maintained, and almost all withered
<ul style="list-style-type: none"> Construction of mini-nurseries 	Support for construction of nurseries in rural villages	<ul style="list-style-type: none"> Production and supply of 16,000 seedlings, but one village stopped activities in the second year
<ul style="list-style-type: none"> Reforestation 	(Training, extension and educational activities)	<ul style="list-style-type: none"> New reforestation of 7.5 ha in social forestry, and private reforestation has also been activated
<ul style="list-style-type: none"> Establishment of land-use regulations 	Promotion of discussion among residents	<ul style="list-style-type: none"> The regulations were established in two of the three verification areas, of which one area has started to enforce the regulations
<ul style="list-style-type: none"> Soil conservation 	Assistance with materials for soil conservation activities	<ul style="list-style-type: none"> Soil conservation activities spread to all the villages, particularly in individual farmers' own fields
<ul style="list-style-type: none"> Construction of mills 	Initial support for construction of mills and procurement of machinery	<ul style="list-style-type: none"> 95% of farmers use the mills, resulting in shortened working hours for women
<ul style="list-style-type: none"> Manufacture and spread of improved ovens 	(Training)	<ul style="list-style-type: none"> About 1,000 improved ovens were manufactured and have spread to almost all the farmers
<ul style="list-style-type: none"> Spread of handicraft manufacture 	(Training)	<ul style="list-style-type: none"> 8,000 bars of soap have been manufactured, and production is brisk in all the villages
<ul style="list-style-type: none"> Spread of improved living standard for women 	(Training)	<ul style="list-style-type: none"> Virtually all women in all the villages participated in the training

Results of verification study projects reflected in the M/P

1. Judging from the current technical level of the local residents, it will be effective to repeat the training courses at intervals, and in particular, those training courses which are ranked at a relatively high level of training (such as, for example, training in vegetable cultivation or seedling planting techniques). For the training courses in some projects, it was planned to increase the frequency of training.
2. In most of the verification projects, it was ascertained that the residents had enough capacity to contribute to the projects, judging from the balance between the residents' vigorous willingness to tackle the projects and their potential capability to provide funds, or from the prospect for revenues from the projects. Thus, the percentage of monetary contribution by the residents was increased.
3. It was also ascertained that the exchange of information between residents on their experiences in a project was effective in enhancing their willingness to tackle projects and in improving their ability to implement projects. The holding of meetings for residents to exchange information on their experiences was added to the plan as one of the components of the "Project to Improve Residents' Ability to Implement Projects" in the M/P.

Conclusions from the implementation of the verification project

Verification through the implementation of the Terroir Management method showed that capacity building of the residents is possible, and that with this as a foundation it is possible for the residents to take the initiative in the development of the rural villages so as to make a contribution to preventing desertification. In the verification project, local liaison staff hired directly by the Study Team as resident facilitators to promote capacity building in the residents were used, but an important task from now on will be the establishment of a promotional system and the capacity building of extension workers, so that the Malian extension bureau will be fully capable of playing their part in resident facilitation.

IV. THAILAND

Volunteer soil doctors

Participatory approach in land management by focal point office for UNCCD Land Development Department, Bangkok, Thailand

Background

Soil doctors, stereotype of personnel of Land Development Department (LDD) who technically assist farmers manage their land, were first known to the public in 1992. This initiative is one of the strategic approaches that the LDD uses for the public to easily understand its tasks and responsibilities. At the first mission, they merely provided technologies and recommendations for soil improvement and conservation practices to create sustainable agriculture. Then, the initiative has been extended in responding with a partnership approach for

resource management when people and community participation become an increasing means for most development activities until the present.

Who are Volunteer Soil Doctors?

Initially, Soil Doctors refers to staff of the LDD. As a result of population pressure as well as long-term economic and social development, the LDD faces rising problems of land degradation with which it can no longer successfully deal relying solely on its own limited staff. Thereafter, a certain number of selected farmers have been recruited to work in partnership with the LDD's staff. They are assigned to be representatives of the LDD and play a key role as collaborators between farmers in their own villages and the LDD's staff for almost all land development programmes on the ground. These farmers are well trained and assigned on voluntary basis. Therefore, the name given to them is widely accepted as Volunteer Soil Doctors.

The LDD initiated the Volunteer Soil Doctors programme in 1995. It is not only a participatory approach that the LDD wishes to shift from a traditional extension but also a good response to the problem of decreasing numbers of the LDD's staff itself whereas a high tendency to have many more projects under responsibility in the near future is not far from real. At present, there are approximately 55,000 of them representing the LDD at village level. The figure is close to the total number of 65,000 to cover the whole country.

How are they selected?

Farmers who are in good health, eligible, at least 20 years of age, willing to work, keen on land development activities and reside in areas concerned, will receive a general training to be aware of the importance of land resources management, conservation and basic practices.

After completion of the general training course, a higher-level training course will be further provided for 10 selected innovative farmers from each village. After this, one among others will be appointed and registered to become a Village Volunteer Soil Doctor who will represent his/her village either by selection among themselves or by a trainer, judging from his/her performance.

Three continual selections for higher sub-district, district and provincial levels are also made among themselves. The selection made for sub-district representative applies with all concerned Village Volunteer Soil Doctors to have only one Sub-district Volunteer Soil Doctor for each sub-district. Accordingly, the District and Provincial Volunteer Soil Doctors are also selected in the same fashion as mentioned above.

What are their missions?

Basically, Volunteer Soil Doctors cooperate in assisting farmers to obtain better understanding and practise soil conservation and sustainable land resources management. Therefore, Volunteer Soil Doctors will be fully supported with tools, maps and manuals which the LDD provides to help them perform their tasks effectively. Moreover, they will receive the privilege of carrying out demonstration farms in close cooperation with the LDD. Nine basic tasks under commitment are:

- (i) They are entitled to carry out public relations activities in making announcements, delivering messages to farmers, inviting farmers to participate in observation, study tours, workshops and others.
- (ii) Being service centres for information and technology transfer, especially through demonstration farms.
- (iii) Volunteer Soil Doctors will be able to give basic recommendations and answers to possible questions they may receive from farmers.
- (iv) They are also entrusted to distribute to farmers some specific agricultural materials such as lime, fertilizer and seeds.
- (v) They are assigned to help farmers know the type and cropping suitability of the lands they own in order to assist farmers to practise sustainable agriculture effectively.
- (vi) They are also assigned to help farmers prepare their farm plans and management especially soil improvement and conservation.
- (vii) They will be messengers who receive feedback, needs, problems and queries from farmers to the LDD for consideration.
- (viii) In case when the LDD starts a new project they will be asked to gather most required information for the project.
- (ix) Occasionally, they will be invited to join in groups of instructors for interested agencies.

What does the network look like?

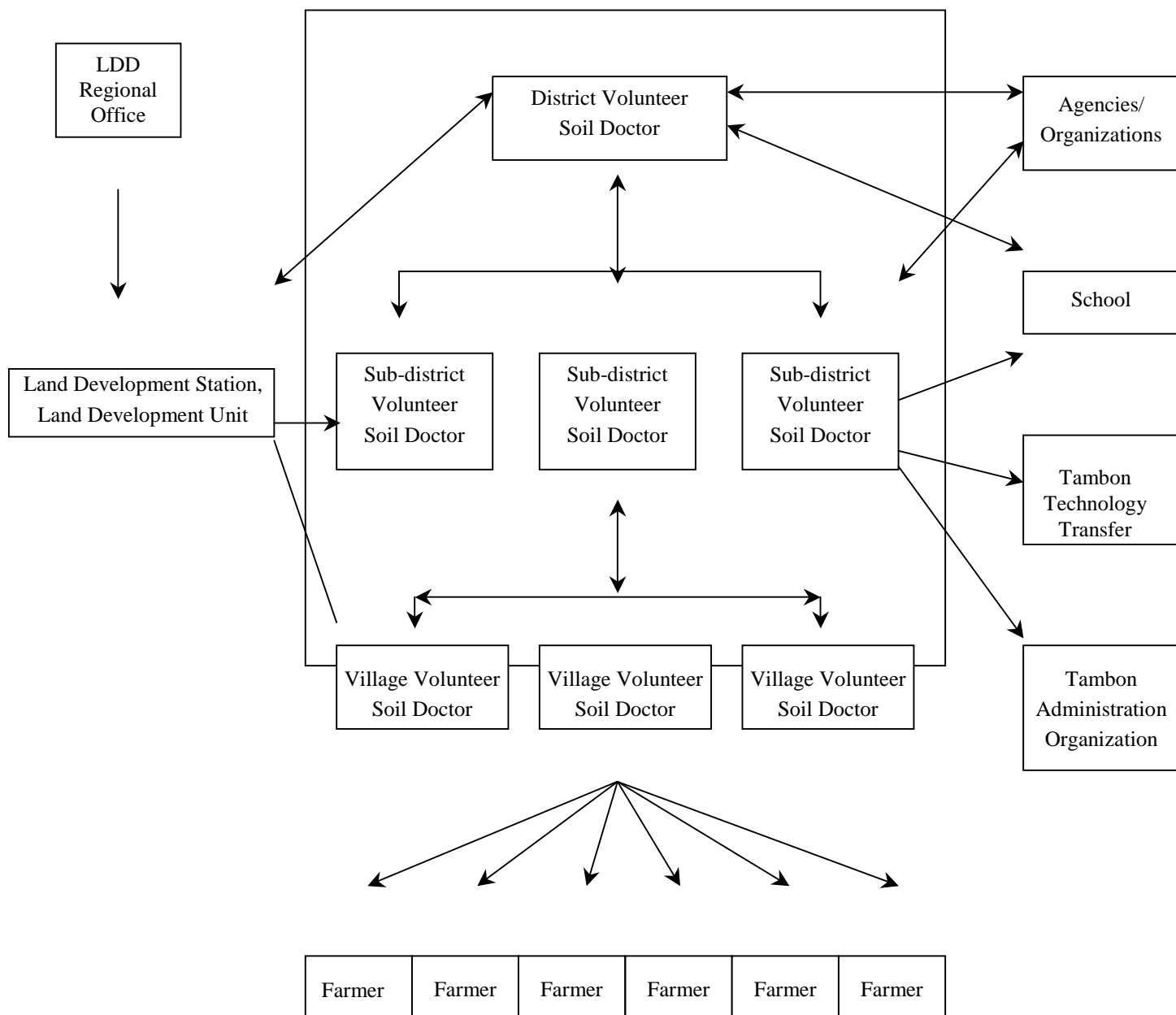
As mentioned earlier, Volunteer Soil Doctors are representatives of the LDD as well as collaborators at different levels. Collaboration has been made systematically through an established network as can be seen in figure 1.

What are their benefits and honours?

After having completed the training course provided and being selected, each Volunteer Soil Doctor will be officially registered and a certificate of competence will be awarded with logo and tools. Consequently, some specific training courses will be further provided to suit the different localities they should take care of. As appropriate, the LDD will periodically organize additional capacity building courses for them. Besides, they will be appointed as associated instructors. To facilitate their roles and activities, the LDD provides them both in kind and in cash for the following activities:

- Free input for demonstration plots
- Payment for data gathering
- Expenditure for communication among themselves and with the LDD
- Payment for giving instruction
- Right to produce soil improvement and conservation materials

Figure 1. Network of Volunteer Soil Doctors



What are the projects they participate in?

Besides its own initiative, the LDD follows a present constitution of which people participation is a prime concern in development activities. For this reason, Volunteer Soil Doctors are fitted into implementing almost all research and development projects of the LDD. A number of projects and activities they have been involved with are as follows:

- Land Development Village
- Tambon's* Technology Transfer and Learning Centre
- His Majesty the King's "New Theory"
- Land and water conservation at regional level
- Saline soils development in north-eastern region
- Small-scale water resource development
- Soil improvement and fertilization by LDD's regional offices
- Vertiver grass plantation and demonstration
- Utilization of organic materials for soil improvement
- Livelihood development for farmers in medium and large irrigation schemes
- Farmers' livelihood improvement after debt suspension
- Natural water resources development for community production
- Seed production for land improvement crop
- Improvement of community production potential

How successful this approach has been?

For the time being, this type of participatory approach appears to be successful at certain levels but still to be a learning experience and certainly needs improvement. The LDD realizes that to some extent Soil Doctors can contribute to success and failure of research and development projects in which they are involved. Hence, this project has been annually monitored and evaluated, though there are some gaps in communication. Support in terms of incentive seems not enough. A lacking of time and readiness of some Soil Doctors due to over workload reduces the level of their performance. However, the survey results have shown that the majority of farmers respond with a good attitude toward the performance of most Soil Doctors e.g. service of seedlings and agricultural material, distribution of leaflets and publications, etc. Farmers apply less fertilizer than before but utilize more organic material for soil improvement. They can observe positive change in soil fertility and increased soil productivity. Thus, it can be concluded that the Soil Doctors programme has been shown to be a successful try of the LDD but correct improvement is still needed.

* Tambon = Sub-district