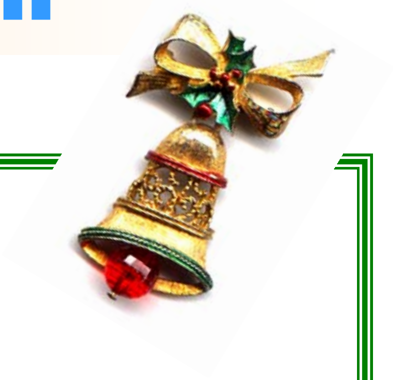
IWMI
SUB-REGIONAL OFFICE
FOR SOUTHEAST ASIA

IWMI International Water Management Institute | IRD Institut de recherche pour le développement

ISSUE 11

SEAWatch

DECEMBER 2005



Dear Friends and Colleagues,

I take this opportunity in wishing you all the very best for 2006 and hope it brings all that you wish for and more. In this respect 2006 will bring with it some significant changes to our operations in Southeast Asia.

Over the past several months a Strategic Alliance has developed between IWMI and WorldFish, a sister CGIAR Institute. In the first instance this alliance focuses on integration of the corporate services of the two centers (so-called shared services). As part of this strategic alliance it has also been decided that wherever possible WorldFish and IWMI will use each other's offices and other infrastructure, resulting in significant cost savings and enhanced efficiencies. In Southeast Asia that means that the WorldFish Headquarters in Penang, Malaysia, offers an attractive and cost-effective way to host our researchers in the region.

At the same time there has been an explicit request from the Cambodian Government for IWMI to expand its operations in country. Currently we are represented by a single person who is assisting the Ministry of Water Resources and Meteorology in their program on Participatory Irrigation Management and Development (PIMD). As I am sure you can appreciate, Cambodia is a country that has gone through tremendous turmoil in the recent past and as a result has limited resources and capacity to address land and water resource issues. As consequence of this request the Board has agreed to expand operations in Cambodia, this being undertaken in close collaboration with the new WorldFish office in Phnom Penh.

Taking into account these demands, IWMI will relocate and restructure its presence in Southeast Asia for maximum efficiency and effectiveness, to continue to implement our Mission in the region. In order to achieve this, IWMI-SEA Regional office in Bangkok will close as of January 1, 2006, and relocate to WorldFish in Penang. Current research staff based in Bangkok will be transferred to Penang or Phnom Penh and will be hosted at WorldFish. With these changes inevitably comes the loss of jobs. In this respect the current national staff component in Bangkok will be made redundant. I would like to take this opportunity in thanking them for their significant contribution to building an IWMI presence in Southeast Asia. Without their commitment and dedication we would not have achieved the level of success that we have in the region.

Let me assure you that this does not mean IWMI's activities in Thailand will cease. On the contrary we will continue current project commitments and will undoubtedly develop further initiatives with our partners and collaborators in Thailand, this being facilitated from our operations in Penang, Vientiane, Hanoi and Phnom Penh.

I thank you for your continued support and look forward to further collaboration and interaction as we move into 2006 in addressing the significant needs of the region.

Kind regards

Andrew Noble

Head, IWMI Southeast Asia.

USING CLAY BASED MATERIALS AS A SOIL IMPROVEMENT STRATEGY

by Sawaeng RUAYSOONGNERN and Andrew NOBLE

Over the past 40 years, land use in Northeast Thailand has changed dramatically from pristine climax forests to agricultural based systems. This has led to severe soil degradation. With the decline in soil quality, farmers have had to rely on heavy applications of expensive fertilizer to maintain crop productivity, thus increasing the burden of debt upon poor farmers.

(Picture 1: Farmer plot with degraded soil)

Several farmers, however, have attempted to copy natural processes by re-establishing trees in the landscape in order to rehabilitate land and soils – but this is a relatively slow process, time-consuming with few quick and tangible returns to the farmer. Therefore, they have tried to find other options to rehabilitate their soils.

From termite mounds............

Farmers first hit upon a method of using termite mound material to improve soil fertility on those soils that had become degraded. This strategy arose from their observation that plants grow better and more productive on termite mounds. Through their observations, farmers started to grow vegetables on soils that had been treated with termite mound materials and got excellent responses. This innovation was pioneered in Sisaket, where shallow wells ensured sufficient water to irrigate the crops throughout the year. This approach spread rapidly throughout the Northeast in areas, where irrigation facilities were available to farmers, and concentrated on vegetable production.

(Picture 2: in situ growing crop on termite mound)

To reservoir sediments........

A further method of soil improvement arose as a result of water resource infrastructure rehabilitation over the past 10 years. As a means of increasing the water storage capacity of reservoirs in the region, the government embarked on a program of dredging sediments from these structures. The sediment dredged up from the bottom of these water storage structures was initially used only for landfill. Farmers subsequently attempted to use these dredged materials to boost the fertility of the soil. The results were mixed due to the variable nature of these sediments.

(Picture 3: Vegetable plots made of soil from termite mound)

To clay based materials.........

As farmers exploited termite mound materials to improve their soils, these materials have become scarce, difficult to find and more expensive. Similarly, the dredging campaign of water storage reservoirs has ended. Building on the knowledge of farmers, collaborative studies between Khon Kaen University and IWMI were initiated in 2002 that focused on rehabilitating these degraded soils. In field trials established at Chiang Yuen, Mahasarakam, these traditional methods of soil rehabilitation were evaluated against applications of locally sourced bentonite clay. The field trials confirmed the validity of both the indigenous method of soil improvement, i.e., the use of termite mound material, composts and dredged material. The trials showed spectacular

USING CLAY BASED MATERIALS AS A SOIL IMPROVEMENT STRATEGY continued from page 2

increases in sorghum yields of over 20 times where applications of bentonite and combinations of bentonite and compost were applied. A farmer's field day at the site was enough to convince them to trial locally sourced bentonite from Lopburi in their fields in 2003 and 2004.

(Picture 4: dredged lake sediment)

Over the past two years, farmers have experimented with applying clay materials to their soils with, in most cases, positive increasing in the yields of a wide range of crops. In a study with organic rice farmers, rates of between 0.6 – 9.6 t ha^{-1} in combination with their normal compost/mature applications have yielded considerable increases in organic paddy rice production as well as profits (Table 1). In only one case was there a decline in profitability associated with the application bentonite, while net increases in income over that of standard practices ranged from US$6 – 592 (Table 1). These results only reflect yield improvements within the first year of applying clays and it is assumed, based on previous field trials, that these yields will be maintained if not further increased within the second year. A further development that has been observed by farmers is that application of clay to paddy rice not only increases yields under rainfed conditions but also increases fish production.

(Picture 5: Better fish production in paddy with clay application at 2 t ha^{-1})

These farmer assessments add to the growing body of information on the role of clay based materials in the rehabilitation of degraded soils. The advantage of such an intervention is that it offers quick and tangible benefits to the farmer. More importantly, improving the productivity of these degraded systems opens new doors and opportunities for farmers to implement more sustainable farming systems, such as the adoption of conservation agriculture. ▣

Table 1. Yields of organic rice and net profit with the application of bentonite in farmer field trials.

Farmer	Bentonite rate	Rice yield		[1]Net profit from bentonite application
		Compost	Compost + bentonite	
	(ton/ha)	(kg/ha)	(kg/ha)	(US$)
Mr. Sen Sookprasert	1.2	958	1916	209.58
Mr. Chai kaewnonghee	1.2	1437	2874	329.34
Mr Yod Ketsipong	0.6	1916	2485	127.25
Mr. Noojee Yodnamkam	1.2	2395	3832	329.34
Don Hee Farmer Field school	1.5	2023	2592	104.79
Ban Yae Farmer Field school	1.2	1149	2131	215.57
Non Haad Farmer Field school	3.0	652	1053	25.45
Kudstian Farmer Field school plot1	1.2	2874	5365	592.81
Kudstian Farmer Field school plot 2	1.2	1473	1592	***0.00***
Laohansai Farmer Field school plot 1	9.6	934	1916	5.99
Laohansai Farmer Field school plot 2	9.6	1449	1766	***-160.18***
Srikaew Farmer Field school	2.4	766	1443	109.28
Kudchiangmee Farmer Field school	1.2	1137	1916	164.67
Nonpakha Farmer Field school	1.5	988	1598	115.27
Anonymous	4.8	3305	4550	191.62

BIO-REMEDIATION - A TOOL FOR ADDRESSING COMPACTED SOILS

By Andrew NOBLE, Shinji SUZUKI and Wannipa SODA

Soil degradation associated with changed land use takes on several forms. As discussed in this edition, soil degradation is associated with declining crop productivity and can be addressed through the application of soil amendments that include bentonite and termite mound materials. However, there are physical constraints, such as the development of a subsurface compacted layer that will not be addressed through the application of soil amendments.

While the development of a compacted subsurface layer is essential in lowland paddy production systems, known as puddling, to prevent impounded water from draining away, such layers are undesirable in upland rainfed production systems. Compacted layers prevent the growth of roots to depth of most crop species, thus preventing access to stored subsoil moisture that is critical in the production of rainfed crops.

In the upland light textured sandy soil of Northeast Thailand, compacted layers often develop due to repeated tillage operations and high wheel traffic loads. Such activities over time result in the development of a compacted layer with very high soils strengths. We can measure the presence of this compacted layer using a penetrometer that measures the soil strength as a probe is driven into the soil. An example of the output from such an assessment is presented in Figure 1.

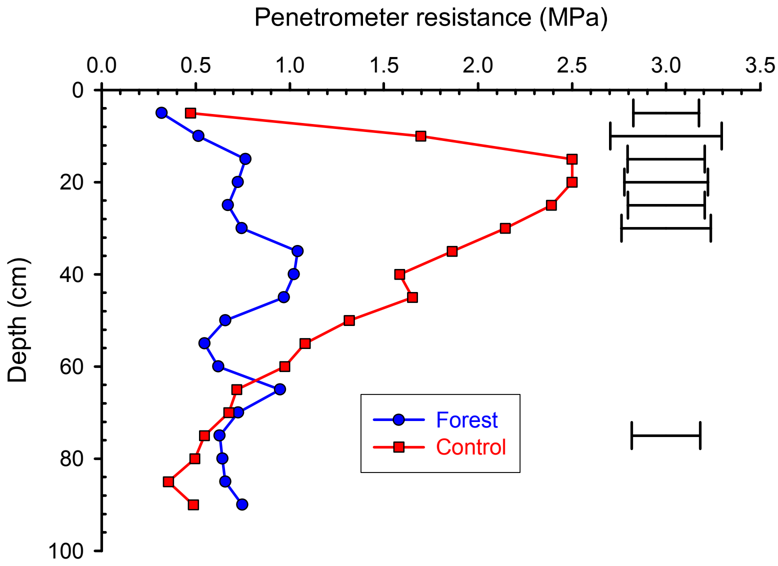


Figure 1. Penetrometer resistance of a field under annual cropping for 20 years (control), and an undisturbed adjacent tree stand (forest). Horizontal bars represent the $LSD_{0.05}$ of the means for each depth.

Figure 1 shows the effects of tillage practices on the development of a compacted layer at approximately 15-20 cm, the working depth of most tillage implements used at a site in Mahasarakam. The forest serves as a reference to what the soil strength would have been prior to changed land use.

Conventionally, to break up this compacted layer we would advocate deep ripping using tined implements , which are, nevertheless, costly and beyond the means of most poor farmers. Over the past 4 years, studies have been conducted to assess the potential of a tropical grass, Gamba (*Andropogon gayanus*), to grow on these compacted soils under rainfed conditions.

One of the objectives of the study was to determine the ability of roots of this species to penetrate this compacted layer. *Stylosanthes hamata* (Taphra stylo), a legume species commonly found in the semi-arid tropics, is known to develop an extensive deep root system that is able to penetrate compacted soil layers and establish stable biopores through the compacted layer that subsequent crops are able to use. It was used as a control species in this study.

(Continued on page 5)

BIO-REMEDIATION - A TOOL FOR ADDRESSING COMPACTED SOILS

Continued from page 4

Four years after the establishment of Gamba grass and Taphra stylos, the root distribution frequencies were assessed under each of these species (Figure 2). The inhibitory effect of the compacted layer is clearly evident with the influence on root growth under the Taphra stylo being greater than that under the Gamba grass. In addition, there is a greater frequency of roots at depth in the Gamba grass than the stylo.

The development of roots through the compacted layer has had a significant impact on access to stored soil moisture. The Gamba grass was able to produce forage all year round even through the long dry season indicating the importance of this extensive deep root system. In contrast, the stylo was not able to produce similar amounts of dry matter throughout the year. It is assumed that as these roots die, they will leave behind stable biopores that will allow subsequent crops, that may not have the capacity to penetrate the compacted layer, to use thereby gaining access to stored subsoil moisture.

These results suggest that there is an inexpensive way of addressing compacted layers through the growing of a forage grass. The added advantage of growing Gamba is that it provides a source of feed to livestock throughout the year, but more importantly, it increases the water productivity of these rainfed systems.

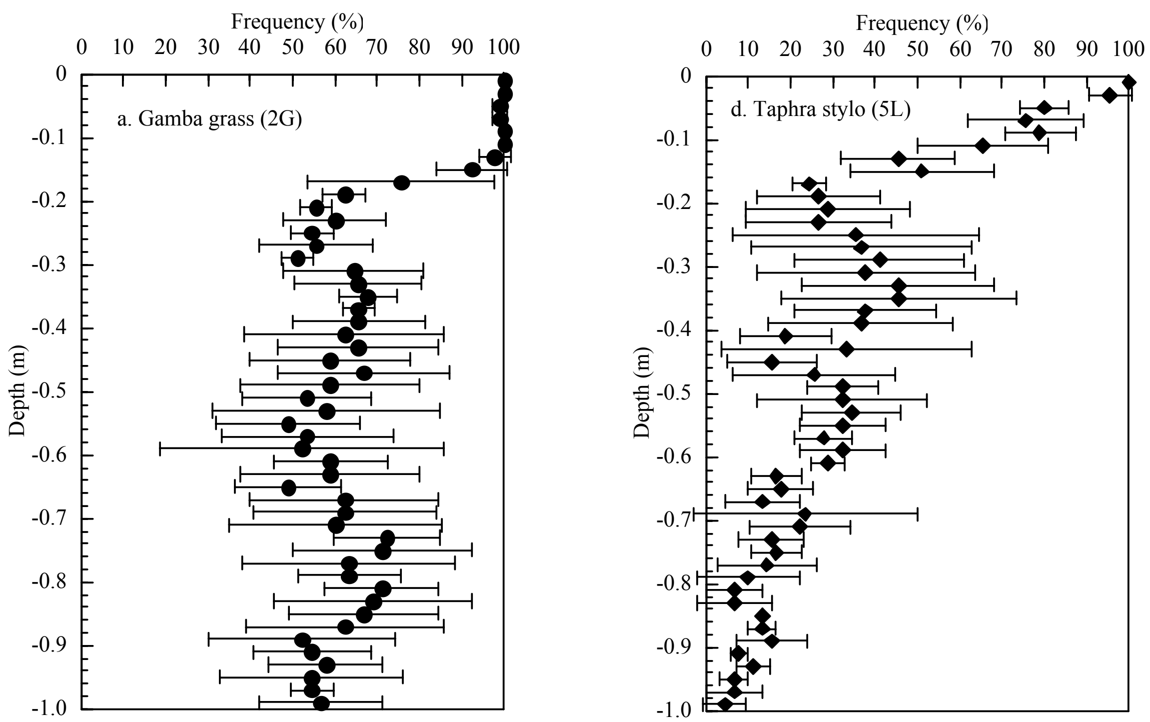


Figure 2. The root frequency distribution frequency down a soil profile for Gamba grass and Taphra stylo 4 years after establishment.

THE INTERNSHIP PERIOD WITH IWMI-SEA AND IRD

BY Seraphine GRELLIER

The 6 months I spent with IRD/IWMI-SEA was a valuable time for me. Before I had arrived Bangkok in February 2005, I had just completed my first year of a master degree program at National Engineering School in Agronomy and Food Industry, Nancy, France where I worked on different methodologies and tools to study a watershed. These methods were applied on several projects in Thailand.

During the beginning of the rainy season, I initiated a hydrological and meteorological survey in a small catchment with steep slope for the Management Soil Erosion Consortium (MSEC) project.

I studied a dozen geochemical parameters (water quality analyses methods) with multi parameters probe CTD 90- Back Scat fluorometer in the Mae Thang reservoir in Phrae province. The objective of the study was to monitor declining water quality in the reservoir that may be reflected to inappropriate agricultural practices in the upper catchment.

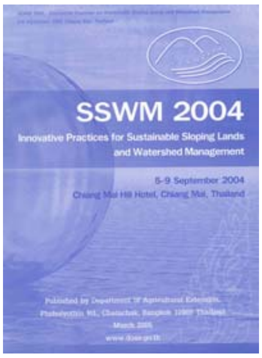
A significant proportion of my time was devoted to putting in place a Differential Global Positioning Systems (DGPS) in order to undertake bathymetric surveys of the Mae Thang reservoir. In addition, I managed with IRD/IWMI-


Seraphine Grellier

SEA research team the installation of this DGPS, data collection and management of georeferenced data to produce a Digital Elevation Model (DEM). This particular activity allowed me at the end of June to organize a 2 day DGPS training course for IRD partners from Land Development Department (LDD) and International Water Management Institute (IWMI).

NEWS

New Publication



Kheoruenromne, I., J.A. Riddell and K. Soitong (editors) 2005. *Proceeding of SSWM 2004 International Conference on Innovative Practices for Sustainable Sloping Lands and Watershed Management*, 5-9 September 2004, Chiang Mai, Thailand. Published by Department of Agricultural Extension, Ministry of Agriculture and Cooperative, Bangkok. 400 pp.

The SSWM 2004 International Conference on Innovative Practices for Sustainable Sloping Lands and Watershed Management was organized by the joint effort of several agencies led by the Department of Agricultural Extension (DOAE), Ministry of Agriculture and Cooperatives, Thailand. Collaborating and supporting agencies included the Land Development Department, Department of Agriculture, Soil and Fertilizer Society of Thailand, International Water Management Institute (IWMI), Royal Project Foundation, Swiss Agency for Development and Cooperation (SDC), Asian Development Bank (ADB) and also several academic institutions in Thailand. It was attended by 240 participants from Asia, Southeast Asia and Thailand.

The objective of this Conference was to provide a forum for the exchange of knowledge and experiences in research and extension technologies at farm community and watershed levels, in order to stimulate cooperation and networking among these parties. The Conference covered three main thematic issues, namely sustainable sloping lands management, integrated watershed management with a focus on implementation methods and outputs, and the roles of networks—including researchers, extension workers and farmers.

The main concept of the Conference encompassed three main factors; humans, lands and technologies for integrated watershed and sloping land management and conservation aiming at sustainable practices.

The Proceedings include the technical papers presented at the Conference, the Conference Program, the Business Meeting Report and the Field Trip Notes.

The technical papers cover 6 areas: watershed management; sloping land management and conservation; land use change and effects on sloping lands; land use changes and effects on sloping lands; the challenge of achieving sustainability and adoption of sloping land practices; farmers and sloping land management; and validation, impact and policy on sloping land management and conservation.

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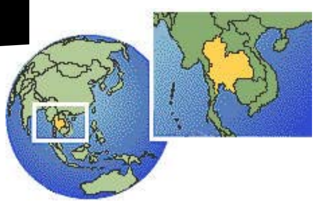

SEAWatch is an e-newsletter of IWMI-SEA. It provides news and progress on IWMI projects and activities in the region.

IWMI's mission is to improve water and land management for food, livelihood and nature.

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