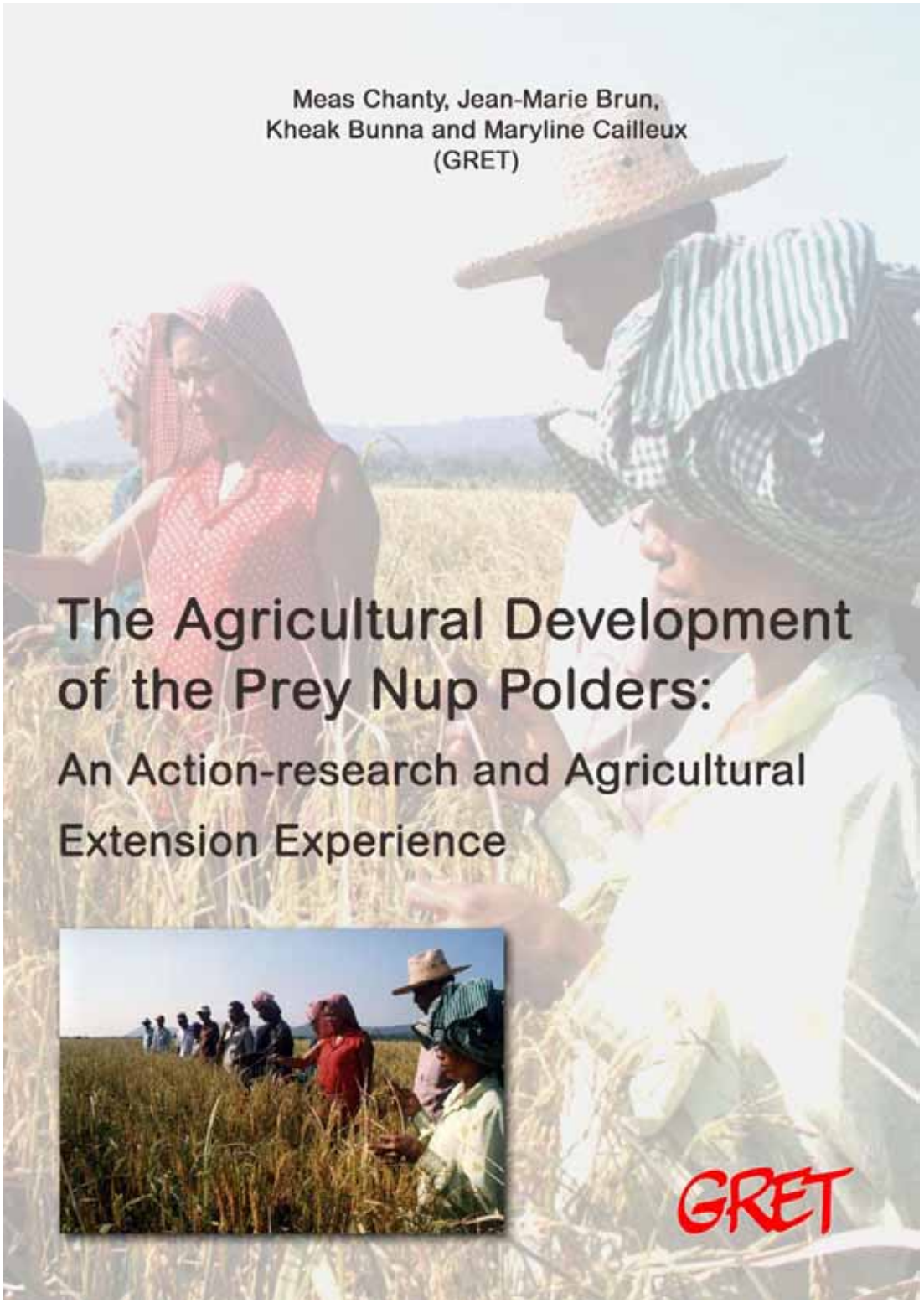




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# The Agricultural Development of the Prey Nup Polders:

## An Action-Research and Agricultural Extension Experience

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# Contents





*The Agricultural Development of the Prey Nup Polders: An Action-Research and Agricultural Extension Experience*

# INTRODUCTION

The Prey Nup polders are located in Cambodia, along national road number 4 approximately 200 km from Phnom Penh and 35 km from Sihanoukville. They cover approximately 10,500 ha of farm land, in the coastal zone of Prey Nup District in the Municipality of Sihanoukville.

The Prey Nup polder rehabilitation project began in 1998 with the financial assistance of the Agence française de développement (AFD), implemented by GRET / ANS, and under the supervision of the Ministry of Water Resources and Meteorology (MOWRAM).

The project's objectives were, first, to physically rehabilitate the polder hydraulic infrastructures and transfer them to a users' organisation able to manage and maintain these infrastructures over the long term. Second, they were to re-cultivate abandoned lands, intensify rice cropping, and diversify agricultural activities within the polders.

In 2006, 3,000 ha of abandoned lands were once again cultivated. The average yields for rice grown in the polders had increased from 1.5 t/ha to 2.7 t/ha[1], with additional paddy production in the zone estimated at 15,000 tons.

These positive effects were the combined result of the physical rehabilitation of the infrastructures, control of water levels in favour of agricultural activities conducted in the polders, and the research into technical references and dissemination done by the

[1] *All-polder average over the last four years of use (2003 to 2006).*

agricultural development support team throughout the polder rehabilitation project (1998-2007).

This paper aims to analyse and document the experience of the project's "Agricultural Development Support" component. It offers a retrospective and critical examination of the actions conducted to find technical references suitable for the milieu and the farmers' situations, and disseminate these technical messages so that they would be adopted by farmers in the polders.

This review of the project's experience aims to be succinct and is designed in priority for Cambodian professionals involved in agricultural research and extension.





# PART 1: The Elaboration of Technical References

## Why Seek Technical References?

Scientific and technical references in the fields of agronomy and zootechnics can be more or less available for general application or, on the contrary, very specifically dependent on the context. For example, knowledge on treating illnesses, plant care, and animal health can generally be applied fairly systematically and relatively uniformly in most contexts.

However, other types of technical advice (most recommendations, actually) cannot be defined once and for all and distributed in standardised, "turnkey" manner independently of the agroecological, social and economic context.

In areas such as Prey Nup, where agroecological conditions are very specific and not very representative on national scale (it is a coastal zone with relatively specific soil, hydrographic and climatic characteristics), the probability of finding pre-existing technical references that have been validated in very similar contexts (and which can therefore be used directly by the project team) was very small. In this case, establishing appropriate references was absolutely necessary to understand and solve the problems identified in this area. Examples of this milieu's specificity rapidly appeared at the start of the project, such as the problems raised by the acid sulphate soils or the very high concentration of organic matter in the soil in zones that had been abandoned for numerous years and targeted for re-cultivation.

## The Choice of Priority Lines of Work and the Diagnostic

During the first months of a project, it is important to define the priority lines of work on which the project's diagnostic efforts, research and actions will focus. At this stage, communication with farmers in the area concerned is primordial. Indeed, the project cannot work in a vacuum and the action-research method must involve farmers from the start. Their interest and motivation depend on the team's ability to respond to their concerns. It is important to grant the problems and constraints identified by farmers considerable space. The penalty for failing to do so is to be unable to spark farmers' interest.

For all this, it may be necessary to also include in the research programme subjects that the farmers do not initially view as sensitive issues. This is all the more true in a development project (polder rehabilitation) that will bring about considerable changes to the environment (when it comes to water and soil). The project must take care to respond to farmers' current expectations while also anticipating the agroecological changes that the developments will generate.

### ▪ The Approach

The approach taken by the project team during the first months of establishing the project therefore aimed to identify the most important subjects, acquire sufficient prior knowledge of these subjects via a diagnostic, and define a system to validate these hypotheses and conduct in-depth action-research.

The approach taken in Prey Nup during the project's first year was structured in the following stages:

- participatory "open" village meetings;
- targeted thematic meetings,
- diagnostics based on field observation and examination of farmers' practices, and
- the definition of hypotheses and an action-research plan.

#### *Participatory Meetings to Identify Priority Subjects*

The purpose of these meetings was to make the project known in the area and dialogue with villagers on the various possible and relevant development subjects. They were held in all the villages where the project would intervene to better





understand the working areas and identify the dominant subjects in the interest of farmers.

Given the open and general nature of these meetings, it was difficult to discuss all subjects and, above all, discuss them in depth because of the following factors:

- too many subjects were raised during the meetings, which were limited in time;
- the interest in the various subjects was very varied;
- running the meetings was difficult because of the very numerous and diverse public;
- the presentation of the project and its objectives at the start of the meetings may sometimes have biased the identification of which subjects were priorities for the villagers;
- etc.

However, these constraints were not inevitable and could partially be lifted or lessened by decisions about how to run the meetings—within, of course, the limits of the available time and resources.

**Sample Agenda for these First Participatory Meetings Held as Part of the Prey Nup Polder "Agricultural Development Support" Component**

Presentation of the Project
- the contracting authorities
- finances and duration
- the organisations and partners involved in implementation
- the project's components
- the objectives

Dialogue with Participants
- confirmation of people's interest in the intervention plan
- obtain basic understanding of the milieu and identify the major production systems implemented by the farmers
- villagers' questions about the project
- the priority constraints for their production systems
- their proposals to mitigate or remove these constraints

#### *Thematic Meetings to Fine-Tune Lines of Work*

Afterwards, smaller thematic meetings were held. These meetings brought together those people interested in the subject following the general meetings. They aimed to

deepen understanding of the context, how the production systems operated and their current constraints, and to better identify farmers' demands.

Open invitations to these meetings were extended to all farmers interested in the subject and more specific invitations were addressed to the farmers interested by and knowledgeable in the subject that were identified during the first general meetings.

One meeting was needed for each type of milieu, in function of the agroecological characteristics or the nature of the primary production systems implemented by the farmers.

### Rice Cropping Diagnostic Meetings:

### The Identification of Different Types of Milieus and the Organisation of Specific Meetings in the Various Corresponding Areas

When the project started, only polders 1 to 4 were scheduled for intervention. After the first series of meetings, we knew that the rice cropping systems in the four polders were relatively homogenous, with the exception of a few cases that were specific from either the agroecological or socioeconomic standpoint. For example:

- Polder 1 was slightly different from the agroecological standpoint because the plots located near the villages were on steeper slopes and the soil was less fertile than in the other polders.
- There was more uncultivated land in polders 2 to 4.
- In Muslim villages, there was more fishing activity.

To take into account this diversity, the project decided to hold specific meetings in the villages in polders 2 to 4 where there was more uncultivated land, other meetings in Muslim villages where rice cropping was secondary, and finally specific meetings in polder 1 where there were more soil fertility problems.

## *In-Depth Diagnostic: Observing Farmers' Practices and/or Surveys to Confirm and Fine-Tune the Information Gathered During the Thematic Meetings*

The information obtained during the thematic meetings was then boiled down to identify the major constraints in farming systems and possible paths towards improvement. At this stage, there was not always enough information to clarify certain situations and validate some of the hypotheses formulated. It was therefore necessary to complete or confirm the information by direct observation on farmers' plots and/or farmer surveys.

This stage required monitoring sheets and survey questionnaires to be prepared.





In addition, the project team needed to take into account in its reflections the changes in the milieu and production systems that polder infrastructure rehabilitation was predicted to cause (reduction or elimination of salt water entry, better management of fresh water, polder drying during the dry season, re-cultivation of abandoned lands, modification of soil use and pasture resources, etc.).

### Observing Rice Cropping Practices in Prey Nup

After the two abovementioned meetings, the problems of salt water intrusion and flooding from rain in the polders appeared to be the major constraints on rice cropping in the polders (before infrastructure rehabilitation). In principle, these problems would be resolved after the dikes, canals and drainage systems were rehabilitated and placed into service. Even though these constraints appeared to be the most obvious ones at this stage, they should be lifted by the developments planned as part of the project. It therefore seemed preferable to not begin an extensive action-research process focusing on adapting technical itineraries to reduce the impact of these constraints. The participatory diagnostic needed to be extended to possibly identify other potentially important factors that may have been hidden at this stage by the effects of hydraulic constraints.

- Were the abovementioned constraints the only ones in the milieu that influenced rice yields, or were there other limiting factors in addition to these constraints?
- Were there any weaknesses that could be improved in the technical itinerary followed by the farmers?
- Could other constraints that the farmers did not see or did not judge important be identified?

To answer these questions, the project's "agricultural development support" team began observations in plots located in the different agronomic zones of the polders.

These observations focused mainly on:

- the technical itineraries used by the farmers (varieties, plant age at transplanting, transplanting density, transplant date, fertilisation, etc.);
- yield component analysis parameters (maximum number of stalks per square metre, number of panicles per hill, number of grains per panicle, weight of one thousand grains, etc.); and
- constraints seen *in situ* (flooding during the observation period and losses that this generated in the various agronomic zones, salt water intrusion and degree it affected crops, etc.).

These observations provided very useful information that helped identify the areas in which significant improvements could be made to cropping practices.

For instance, yield component analysis in the observed plots revealed that the factors that determined yield variability were mostly associated with the growing stage of plant development (tillering and panicle initiation). Parallel analysis of technical itineraries made it possible to identify causes that could be corrected (transplanting too late in the season, or transplanting plants that were too old, for example).

Another illustration of the interest of plot observation is the observation, through results analysis, that the response to using DAP fertiliser in low-lying areas of the polders was good. An experimental protocol was then launched to confirm this observation, which made it possible to progressively elaborate a specific recommendation on fertilisation in the low-lying areas with acid sulphate soils.

## *Elaboration of Final Hypotheses and Definition of Verification Systems*

The preceding stages gave the project team a good vision of the primary constraints that weighed on production systems, or at least the problems these systems were facing. From this, the team formulated explanatory hypotheses and envisaged practical solutions to resolve or limit the effects of the constraints identified. Alongside these hypotheses, verification systems were defined and implemented. These included the experimentation protocol, the search for additional outside references, and calling on outside expertise on highly specific questions. It was important to turn to existing technical references. Doing so saved time confirming our hypotheses (or adjusting them) and elaborating more effective and more pragmatic experimental systems.





### Abandoned Lands in the Prey Nup Polders

At the start of the project, there were approximately 3,000 ha of uncultivated land in the polders. After the meetings and surveys of farmers that had plots in these areas, the major problems were identified and the hypotheses and verification systems were elaborated.

| Problems Identified Prior to Polder Rehabilitation | Hypotheses Formulated | Verification System |
|---|---|---|
| 1 - Presence of salt water<br>2 - Lasting flooding<br>3 - Weed invasion<br>4 - Unstable soil that does not allow tools to be used to prepare the soil<br>5 - Massive damage by pests<br>6 - Plants poorly developed, even dead, after transplanting | Problems 1 to 4 are related to the physical structure of the polders.<br>These conditions will probably change once polder rehabilitation is complete (isolation of the milieu and water management).<br>This problem is linked to the isolation of the plots cultivated. Increasing the cultivation of low-lying zones would lessen this problem.<br>This problem is probably linked to the chemical properties of the soil or water in these areas. Eliminating toxic elements can attenuate this problem. | - Search for references to confirm soil stability after salt water has effectively been prevented from entering a zone.<br>- Observing and monitoring the re-cultivation dynamic once the polder infrastructure is operational.<br>Monitoring the degree of crop destruction as re-cultivation progresses.<br>- Search for references to confirm this hypothesis.<br>- Soliciting experts in acid sulphate soils.<br>- Preparation of an experimental system to improve the removal of toxic elements. |
| **Problems Anticipated After Polder Rehabilitation** | **Hypotheses Formulated** | **Verification System** |
| The re-cultivation of abandoned lands will be done at the detriment of pasture lands for animals, especially buffaloes, whereas they are an important source of traction to work the land in the area, and the lack of traction has been identified as a factor that limits re-cultivation potential.<br>Cutting down weeds [especially *Smao Plong (Eleocharis sp)*] to allow re-cultivation increases the amount of toxic elements in the soil such as $H_2S$, iron and aluminium. | The sale of motorised services (small tractors or two-wheeled tractors) may emerge to work the soil in the area. This will compensate for the farmers' demand / traction.<br>The following practices can reduce the presence of toxic elements:<br>- Burning weeds during the dry season.<br>- Gathering weeds and keeping them at the edges of the plots. | - Monitoring the number of tractors and two-wheeled tractors working in the polders.<br>(If this does not happen spontaneously, the project will attempt to encourage this evolution.)<br>- Observing farmers' weed elimination practices.<br>- Experimenting soil preparation incorporating and not incorporating weeds in the plots.<br>- Testing the removal of toxic elements. |

## ■ Subjects Selected

### *Subjects Selected Following the Diagnostic and Verification Phase*

Following the stages described above, the activities and experiments to conduct on the various subjects were well-defined. They were submitted to the same thematic groups for validation. Each of the farmers present at the thematic group meetings were then invited to participate by running the experiment on his plot.

The subjects selected (in each of the groups) depended on the following conditions:

- the possibility of diversifying the activities conducted in the area (which itself depended on the resources that the farmers had: land resources, labour, access to water (notably for market gardening), funds, etc.);
- farmers' demands and participation;
- the project's technical and financial capabilities;
- the match with the project's objectives;
- the duration of the intervention and the intervention's (potential estimated) impact;
- etc.

### *Subjects Selected as Work Progressed*

Some subjects were not identified at the start of the project. They emerged progressively as the project team deepened its knowledge of the field, or following unanticipated changes in the conditions in the milieu. A sufficiently flexible project structure that allowed the action plan to be adjusted as the project advanced was a very important advantage. In this case, the Prey Nup polder rehabilitation project's mode of organisation and steering, which left a degree of manoeuvring room to the practitioner, allowed the project to be reactive and was both relevant and useful.

#### Acid Sulphate Soils

The characteristics of acid soils were presented to the farmers and discussed from the start of the project. However, this subject did not seem to be a priority in farmers' discussions and, consequently, in the project's initial work programme. Indeed, the majority of land concerned was not cultivated at that time, and the entry of sea water during the dry season could have had the effect of limiting acidification.

In 2001-2002, the principal dikes that protect against the entry of sea water were





finished and the process of re-cultivating abandoned lands began.

After transplanting, the project noted that the transplanted plants in some of these lands died or did not grow after one week to ten days. These events led the project to see the subject of acid sulphate soil as a priority and make this a line of work. Studies, experiments, and visits from international experts were conducted to better understand how these soils function, evaluate the risks, and identify "good practices". A mode of organisation among farmers was proposed to improve the removal of toxic elements to allow these lands to be re-cultivated and preserve their fertility. The risks associated with prolonged and in-depth drying of the soil were included, along with other things, as part of the decision by those in charge of the "Polder Users' Community" in charge of water management.

### *Subjects Dropped During Project Execution*

Certain subjects clearly identified at the start or during the work were later dropped suddenly or progressively either because changes in the context made them less relevant or because certain constraints (technical, economic or social) had not been anticipated or had been underestimated. The two examples discussed in the boxes below illustrate the failure and dropping of two experimental activities: the first (the bunds construction support programme) because of primarily social constraints, and the other (prawn farming) because of a lack of technical mastery.

#### The Bunds Construction Support Programme Failed Because of Social Constraints

In the Prey Nup polder area, the vast majority of plots are not surrounded by bunds, which limits the possibility of intensifying rice cropping and accentuates the collective constraint on water depth management.

The topic of building bunds was discussed with groups of farmers and spiked their interest. The collective dimension of this activity was rapidly identified: to limit land loss and work, the farmers were interested in building bunds on the condition that they were dividing dikes (half on their plots and half on their neighbours' plots) and that the neighbouring landowners shared the efforts to build them.

The project therefore opted for an approach that prioritised work in priority zones and facilitated (with the support of the local authorities) consultation among landowners within these zones. To encourage the adhesion of all farmers in each development zone, and given the considerable cost of building these bunds[1], the project granted a subsidy (of up to 35 US dollars/ha) to all farmers that enclosed their plots in the priority zones.

The vast majority of landowners (90% to 95%) agreed on these conditions, as long as

the encroachment of the bunds was divided between adjacent plots and the work was shared. However, when one landowner would refuse to take part in the programme and would not allow his neighbour's dike to encroach on his plot, then his neighbour was no longer willing to build the bund alone and entirely on his plot. Thus, the few landowners who rejected the conditions proposed started a "domino effect" that caused the entire operation to fail even though it was desired by the majority.

———————

[1] The texture of the soil in the polders made it necessary to build bunds that were fairly wide, especially at the bottom, in order for them to be stable. After noting the poor longevity of the first small dikes built, the project imposed dimensions of at least 1.10 m in width for the base and at least 50 cm in height.

△ ***Bund under construction in Samrong Leu (polder 4), in May 2005. The nature of the soil made it necessary for these bunds to be voluminous, which is time consuming and reduces the useful surface of the plot. The system was only accepted if the landowners of adjacent plots shared the work and the loss of land due to the dikes equally. Refusal to participate***





***by one landowner would cause a chain reaction among his neighbours, who would abandon the plan.***

### Poorly Mastered, Prawn Farming Performed Poorly and Was Not Profitable

Out of a concern to diversify crops, the project team set up, with the villagers, several experimental workshops to exploit the polders' aquaculture potential. Fish farming activities were set up, notably attempts at prawn farming (*Machrobrachium rosenbergii*). Raising this shellfish can generate high value added, but it requires excellent technical mastery.

The extensive and "rustic" prawn farming methods set up in the polders turned out to be little productive. Among other things, the post-larvae needed to be imported from Vietnam or Thailand, which cut the activity's profitability. To overcome this constraint, the project attempted to set up a "hatchery" to attempt to implement local reproduction and post-larvae production. Without much success. The project had to face the truth: mastery of this activity requires technical skills that the team did not have. Aquaculture was not a priority sector of intervention for the project, hiring a specialist was not envisaged, and this activity was logically abandoned.

## The Experimentation Method

### ▪ Proposal and Validation of Activities and Experimental Systems

With a reliable diagnostic of the production systems, and after having fine-tuned activity proposals, experimental systems and the modalities of the partnerships with the farmers for each subject, the project team organised a new series of meetings with the previous thematic groups to present, discuss and validate these proposals. During these meetings, the project identified those farmers interested in getting involved in these activities and experiments.

Before the rice cropping season, general village meetings were also held to inform the other farmers likely to be interested in the activities proposed. The farmers' reactions to and proposals regarding the proposed activities during these meetings were also taken into account to adjust them to needs.

## ■ How the Experiments Were Organised

### *Farmer Experimentation*

The experiments were conducted mostly by farmers on their own plots. The idea was to cover, in this way, the diversity of agronomic situations, integrate socio-economic constraints (that "on station" experiments ignore), and involve farmers directly in this action-research process so that they take greater ownership of the results. The role of the field agents was to explain the objectives and details of the experiment protocol to the experimenting farmers and then help them with implementation. In general, one agent worked with several thematic groups (7 to 8 groups per agent) and, for each thematic group, had between one and five tests to supervise.

The agents' presence was indispensable to set up the experiments. They needed to be present frequently at the start of the experiments to verify the implementation conditions and keep the farmers appraised of the method (compliance with the protocol). During the experiments, the agents were present in the villages three to four times a week to visit all the thematic groups. Field visits were conducted regularly with the farmers in the various phases that required monitoring or sampling to obtain assessment indicators. For instance, for the comparative variety tests, the plots were visited at the end of tillering in order to count the number of stalks per hill and compare the varieties' tillering capacities.

In the last phase of the experiment, contact between agents and farmers was increased again (2 to 3 times a week for each farmer) to organise the assessment of results and measure the final assessment indicators.

At least one visit was held for each thematic group prior to harvest. These visits made it possible to share (and observe) the results and exchange information among farmers in the group.

Each thematic group meet after analysis of the experiment results.

**Illustration of the Working Time by a Field Agent Needed to Monitor the "Rice" Experiments in the Prey Nup Polder Rehabilitation Project**

In 2001, the project mobilised 18 agents, hired among villagers in the intervention zone, and worked with the following thematic groups:

- variety test groups (7 to 8 tests per polder, for a total of 44 tests);
- fertilisation test groups (3 tests per polder, for a total of 18 tests);
- transplanting density test groups (2 tests per polder, for a total of 12 tests);
- plant age at transplanting test groups (2 tests per polder, for a total of 12 tests);





- comparative test groups comparing the "packet technique" and farmers' practices (2 tests per polder, for a total of 12 tests);
- transplanting date test groups (1 test per polder, for a total of 6 tests);
- IR 66 test groups on plots after nurseries (2 to 3 tests per polder, for a total of 16 tests);
- demonstration plot groups (10 to 11 tests per polder, for a total of 65 tests).

In principle, one agent took responsibility for 8 thematic groups composed of 10 to 11 experiments. In addition to being in charge of monitoring the experiments, each agent was also in charge of taking:

- approximately 80 paddy samples, on small patches of 1 square metre in various plots in the polders to as to implement yield monitoring; and
- approximately ten soil samples to monitor soil (4 times a year).

The 18 agents were supervised by:

- A technician (an agronomist) who was responsible on the technical level for test implementation and in charge of supervising the organisation of various visits and meetings. This technician also centralised the monitoring data collected and entered the data into the computer.
- An engineer in charge of the "Agricultural Development Support" component and therefore the entire programme. He elaborated the experimental systems, analysed the results of the tests, and produced the summary of results. He also provided the agents with support for their visits and meetings with farmers.

In short, the advantages of this method were as follows:

– The experiments were done in real conditions and by farmers, which meant that the effects of their practices could also be observed.

– The experimenting farmers understood the method well and could judge the results for themselves.

– They could make observations on the evolution of the tests and on the differences between the expected test results, real test results, and the results of their usual practices.

– They could begin to disseminate the results of the experiments from farmer to farmer.

△ ***Monitoring tillering in an experimental plot (September 2004)***

### *Selection Criteria for Experimenting Farmers*

The criteria for selecting participating farmers were as follows:

– They were interested in the subject of the experiment (interest expressed during the presentation meeting and discussion of activities) and ready to get involved.
– Their plots met the criteria required for the experiment (location of the plot in relation to the type of variety, homogeneity of soil fertility, with or without small dikes, plot slope, etc.).
– Their plots were accessible and nearby to facilitate monitoring and the demonstration effect (visits, etc.).

The experimenting farmers meet in informal groups on the various subjects. The experiments were conducted individually, as was the assessment of results. Collective work was also organised to foster exchange among farmers through plot visits, group discussions at key moments in each experiment (after the experiment visit and final assessment), and for final validation of results.





#### The Rice Variety Experiment Group

Three categories of rice varieties were used in the Prey Nup polders, depending on the agronomic zone:

- early rice is grown in the highest zone, near the villages;
- middle rice is grown in the middle zone of the polder; and
- late rice is grown in the lowest zone.

Variety experiments were conducted in the 3 principal agronomic zones of the polder by groups of about ten farmers.

- early variety experiment groups (3 varieties on 11 farmer plots);
- middle variety experiment groups (3 varieties on 19 farmer plots);
- late variety experiment groups (3 varieties on 14 farmer plots).

Local varieties with good reputations in each rice category were selected by the participating farmers to act as controls.

Each farmer prepared his own plot individually for implementation, following the instructions in the experiment protocol (under the supervision of the project agents). Then, each filled out an experiment form and gave his assessment of the characteristics of the varieties tested, comparing them to the local variety used as a control. The following criteria were taken into account and evaluated:

- the vigour of the plants in the nurseries;
- the ease of pulling up the plants;
- tillering capacity;
- the plants' resistance to flooding (for the low areas);
- yields;
- the shape and colour of the grain;
- the stalks' resistance to lodging;
- plant height;
- ease of threshing;
- organoleptic properties;
- etc.

Cross visits within the group and to other groups were organised so that the farmers could discuss the results and their impressions with each other and learn about the other varieties being tested by their neighbours.

The experiment protocol was generally the same for each thematic group, but could be adjusted in function of the conditions of a given agronomic zone.

## ■ Farmers' Participation in Validating Results and Technical Advice

The farmers needed to participate in validating the results of the experiments so that the recommendations could be adapted to their needs. Whether or not this validation worked depended on various things:

- the animation provided by the meeting leader, the way in which results are presented, and the translation of these results into technical advice;
- the subjects of the experiments and the "visible" nature of the results obtained (*cf.* the variety and fertiliser experiment in the box below); and
- the farmers' knowledge of the subjects discussed.

### Criteria that Could Be Visualised Facilitated Farmers' Validation of Experiment Results: Varieties and Fertiliser Tests

Tests of varieties and fertilisation are generally easier for farmers to observe and assess because they can compare the characteristics of the varieties or fertilisers proposed by the project with their own practices (controls).

Farmers are able to analyse the different characteristics of a variety (resistance to drought or flooding, for example) and evaluate both its advantages and inconveniences in relation to their specific situations and the criteria that they wish to favour as farmers.

For instance, the CAR8 variety has good tillering capacities, resists flooding and has good yields, but presents the inconvenience of having tall stalks that make harvesting more difficult.





△ ***Variety experiment plot (CAR6 variety) in 2001.***

### Mobilising Farmers' Knowledge Makes It Possible to Move Intelligently and "Subtly" from Experiment Results to Technical Recommendations: Work on Plant Age at Transplanting

The results of the trials confirmed that transplanting younger plants had better results when it came to tillering and thereby yields. When this conclusion was presented to the farmers, nuances were rapidly introduced. The farmers did not contest the better tillering capacity of young plants, but the ones that knew the polder environment well insisted that the younger plants were also more fragile, had shorter stalks, and were therefore more sensitive to flooding. Consideration of this risk therefore pushed for adjustments to be made to the recommendation that young plants be used, notably in low-lying areas of the polders where the risk of flooding is high during transplanting season.

In this way, the farmers' participation in analysing the results and formulating advice made it possible to adjust the technical recommendations to the specific conditions in the polders and ensure their relevance and operational nature. Without this stage, the recommendations arising from analysis of experiment results alone—even though the experiments were conducted in the polders—would have been inappropriate for some farmers.

The modifications and/or adjustments that farmers proposed to validate the results and turn them into technical advice were generally related to consideration of specific constraints of an agroecological (as in the box above), social or economic nature.

### Adapting Recommendations to Farmers' Reasoning

Farmers' opinions of any given recommendation include criteria that the project had not anticipated and that needed to be taken into account. In a variety test, it was noted that one new variety introduced was much better than the local variety used by the farmers, on all points: phenotypical character, organoleptic qualities, and yields. Despite this, some farmers did not want to use this new variety for the following reasons:

- reluctance to change consumption habits during the transition period; and
- fears that their families would not have enough rice because more rice would habitually be eaten during the year. Indeed, farmers anticipated (rightly or wrongly) that members of their households would eat more rice because the new variety was more tender and tasted better: "if it is better, we will eat more of it, and might run out before the next harvest!"…

These farmers' strategy was to produce mediocre rice for household consumption. Producing and selling quality rice to buy mediocre rice was not seen as a strategic option for households that were barely self-sufficient in or lacked rice.

### Inclusion of Microeconomic Constraints in the Formulation of Technical Recommendations: The Cost of Transporting Plants

To increase rice production, the project recommended that nursery plants not be kept too long after they had been uprooted and soaking their roots in water or a DAP solution when the plots had acid sulphate soil. The purpose of this piece of advice was to prevent the loss of plant vigour before transplanting and to stimulate root development, especially in these soil conditions.

The farmers understood this problem but, for economic reasons, they would rather dry the plants a little to be able to transport them in large quantities to the transplanting plot in sheaves.

Labourers must be paid for most rice cropping activities in the polder (distance from the village, larger plot, difficulty reaching the plot, etc.). When the sheaves are fresher, they are heavier and they therefore cost more to transport to the plots than sheaves of slightly dryer plants.

This does not mean that the recommendation was poor, but that its interest must be demonstrated including the additional indirect cost that it could generate.





## Suitable Application Scales for the Recommendations

The recommendations made by the project concerned two levels of action:

- individual action, and
- collective action.

### ▪ Individual Action

These are the recommendations or advice that a farmer can implement alone, and whose effects or effectiveness does not depend on the practices of other farmers around him. This type of advice is mainly linked to techniques to improve farmers' cultivation practices.

### Examples of Individual Action Advice

On rice:

- Advice on applying fertiliser;
- Advice on plant age at transplanting;
- Advice on transplanting dates.

On stock farming:

- Advice on parasite elimination and vaccination for pigs (with a nuance: in this last case, the protection provided by vaccines is better when the majority of farmers vaccinate their animals—epidemiological effect);
- Advice on animal feed;
- etc.

### ▪ Collective Action

These are the recommendations or advice whose effectiveness depends on collective and simultaneous implementation. This type of advice deals primarily with solving phytosanitary (pests attacking crops, epidemics) and environmental (toxicity of the milieu, pollution, etc.) problems.

### Synchronisation of Phytosanitary Intervention: Armyworm Eradication

During the 2002 season, the plants in the nurseries were massively destroyed by

armyworms. Only collective action was possible to limit the attack.

In principle, when armyworms attacked, the farmers tried to control their plots individually, but far from simultaneously. This did not allow for efficient lessening of the attack. For this type of intervention, the project held a meeting with the villagers concerned to explain that effective measures to prevent armyworm attacks depended on collective and simultaneous administration of the treatment. To motivate villagers to participate in testing this recommendation, the project subsidised 50% of the farmers' plant care products on the condition that they followed all the advice recommended to combat this insect.

### Collaboration Among Farmers to Remove Toxic elements from Low-Lying Zones

It had been impossible to drain plots located in depressions in the middle of the zone affected by toxicity (in acid sulphate soil areas) because there were not any canals or trenches able to carry the toxic elements to the polder drainage canals. The effectiveness of the advice depended entirely on organising collective drainage by digging trenches that were connected to each other to connect the plots in the low-lying area to the primary polder canals.

To encourage the farmers to dig these trenches, the project subsidised one bag of DAP (which can attenuate toxicity) for 1 ha of drained land, on the following conditions:

- dig trenches that connected to each other and to the primary canals, and then let drainage happen from the start of the season until transplanting;
- clean and verify that the trenches work properly at least twice between the time they were dug and when rice was transplanted; and
- transplant rice onto the drained plot (the goal was to re-cultivate abandoned lands).

The farmers' participation in the two abovementioned actions was primarily linked to their own interests. The subsidy made it possible to motivate them to test, the first time, coordinated action so as to demonstrate its usefulness. Once the effectiveness of joint action had been proven, farmers were more easily inclined to opt for joint action when the same problem arose again. What remains is the question of leadership or initiative-taking. When there are no initiators among the farmers facing the problem, outside "stimulus" may be necessary to launch the dynamic of cooperation. In this vein, the Provincial Department of Agriculture can act as a "catalyst", as the project had done.





## Challenges and Difficulties for the Shift to Dissemination

The research and experiments needed to be conducted over at least two crop cycles so as to obtain understanding of farmers' practices, and test and confirm the various hypotheses.

In Prey Nup, the project invested approximately four crop cycles (one cycle/year) in this area of work for the following reasons:

- There was a lack of specific, national-level technical references on coastal zones or polders, the soil characteristics of which are very specific.
- Some recommendations were ready earlier but their dissemination and implementation were very limited the first years, until the polder rehabilitation was complete and the hydraulic operation of the polders had stabilised. In addition, large-scale dissemination required the elaboration of other tools, working methods and modes of organisation. The following section describes the challenges presented by this shift.

# PART 2: The Dissemination of Technical Messages

## ▪ Change of Scale, Change in Work Methods

The first two phases of the project made it possible to elaborate suitable references and recommendations. The farmers that took part in the experiments were the first to receive technical advice and detailed training.

However, after this rice phase:

- Approximately 450 farmers had been part of the experiment network, out of 8,500 farmers growing crops in the polders.
- 18 field agents, 1 technician and 1 coordinator were mobilised for this phase.

The goal of the last phase of the project (2002-2007) was to reach the vast majority of the approximately 8,500 farm households in the polder zone.

A change of scale was therefore necessary. This required a change of methods.

In the Prey Nup polders, rice was grown on approximately 10,500 ha. There were approximately 8,500 households, most of which farm households, in the 43 villages concerned by the project. How could one assist the 8,500 households in implementing the project's technical advice?

Various tools were set up to promote the technical recommendations among the farmers, such as:

- general information meetings;
- thematic training groups (on market gardening, stock farming, etc.);
- exchange visits;
- demonstration plots;
- exhibits in important social events in the district (water festival);
- the agricultural fair, etc.

To encourage farmers to participate in these activities, the project organised "question-and-answer" type games in which participants could win small prizes (rice





seed, for example). Not only did these games draw more people, the question-and-answer games were a communication support in and of itself (the questions dealt with the technical advice promoted) and motivated participants to pay careful attention to the content of the messages disseminated.

### Events at the Service of Agricultural Development: Festivals and Fairs

Village information meetings focused exclusively on spreading technical messages did not always draw a large crowd. Ultimately, they only reached a limited number of farmers. The project team therefore envisaged the possibility of holding a more festive and popular event. In fact, two types of events were held:

- the Water Festival (based on the traditional Khmer Water Festival, notably with rowboat racing). Initiated by the project, it has become an annual event that the local district authorities continue to put on every year; and
- the Agricultural Fair.

This second event is less frequent (3 fairs were organised by the project, in 2001, 2003 and 2006), but draws crowds thanks to the scheduling of concerts and shows in which nationally famous artists perform (television stars). Its success is guaranteed, with several thousand people attending the event in the evenings. To take maximum advantage of the presence of the crowds, the show is interspersed with presentations at the podium (or on "large screen") of information on agricultural development.

The fair grounds are surrounded by stands manned by the project, its partners, other agricultural sector actors, and equipment and input suppliers. These stands spread information all day and during the evening. Here too, games are held with prizes to be won (for example, t-shirts printed by the project, which are another dissemination support).

Agricultural contests also make it possible to show the potential of certain plant crops that are relatively new to the district. They are also an incentive for farmers who wish to participate in the contests to "take particular care" of their crops and thereby have nice plots in the polders, which make up as many "demonstrations" in the villages.

△ *The Prey Nup Agricultural Fair – February 2006*

These games were often used in the general information meetings, to organise visits, in exhibits, and at the agricultural fair. During the agricultural fair, in addition to

these games, the project presented photos illustrating the activities and technical innovations, and set up various agricultural product contests to draw farmers' attention to the existence of new products and technical innovations to improve crop productivity. At the fair, the project also organised meetings between the various suppliers of services, inputs and farm equipment and farmers so that they could discuss their supply and demand directly.

These methods primarily allow the project to inform farmers of the existence of technical innovations that help solve specific problems or improve specific situations in regard to agricultural practices. However, hearing or reading these technical messages is not enough to ensure that farmers have understood them and can implement them effectively. Furthermore, technical change is always a risk—one that farmers will only be ready to take when they fully master how it works, its interest, etc. The low general levels of literacy and schooling in the rural world is also a limiting factor for this type of advice operation.

However, the risk seems less and more acceptable when farmers are offered support from a skilled person to implement recommendations. For this reason, a more structured dissemination mode was proposed, with technicians that regularly monitored farmers' practical implementation of the recommendations in their fields.

This support and assistance was organised in thematic groups. Classic dissemination methods were used in addition to provide more in-depth information and make farmers outside these groups aware of the technical innovations. The goal was to motivate farmers to progressively join this type of group or simultaneously stimulate their requests for farmer-to-farmer transmission from people around them.

The interest of group work combined with in-field advice (i.e. individual assistance with practices) is also that it strengthens farmers' capabilities to analyse new technical difficulties and the economic functioning of their production systems, and to identify more effective modes of identification by fostering exchange.

## ▪ New Method, New Team Preparations

### *Training Team Staff*

During the first and second phases, the project's field agents and technicians obtained good understanding of the milieu, production systems, and technical advice suited to the polders' various agroecological zones. However, their abilities to run groups and dialogue with farmers were not initially very developed and did not progress much during this period. Yet, these abilities would be decisive for the





success of the method proposed during the dissemination phase. It was therefore necessary to train the agents and technicians in this new type of work.

### *Preparing New Working Tools*

New tools also needed to be designed for each thematic group so as to facilitate group animation and discussions with farmers. These tools focus on the outline and structure of each group meeting, and the preparation of illustrations (posters to facilitate explanations of technical advice, etc.). New monitoring tools also needed to be prepared so that the project would have a real capacity for individual[2] and collective supervision of the members of these groups.

### *Sharing Responsibilities to Attain the Objectives*

The Prey Nup polder rehabilitation project's agricultural extension component team consisted of only 12 field agents for rice and market gardening (2 agents per polder of approximately 2,000 ha of rice paddies), 1.5 technicians working on rice, 1.5 technicians working on livestock farming, 1 technician on market gardening, 1 executive specialised in animation and communication techniques involved in a crosscutting manner in the various technical themes, and one agronomist in charge of this entire component of the project.

To attain its objectives in four years, the project defined an action plan that determined for each year a target number of farmers who should have received close monitoring and support implementing technical recommendations. Responsibilities were shared among project agents to set up farmer groups and implement the

[2] *Individual supervision is important to allow technical recommendations to be fine-tuned in function of specific plot characteristics, or to take into account farms' specific constraints of technical, socioeconomic, or other nature. In additional, individual monitoring helps identify possible misunderstandings and rectify them.*

activities within these groups. For the rice groups, the technicians primarily supervised the work of the agents (who acted as relays); the livestock technicians, for their part, worked directly with the groups they supervised.

**Quantitative Support Objectives**

**1- Rice Groups**

- In one year, the plan was for approximately 800 farmers to receive close support (between 40-46 groups of 17 to 20 households). Each agent was responsible for 3 or 4 groups.
- General meetings to spread technical recommendations were held 3 times a year. From 43 to 46 meetings, for a total of 1,200 to 1,800 people attending each time. Each agent was in charge of 3 to 4 meetings, 3 times a year.
- One technician and one animator helped the agents elaborate technical tools, perfect meeting animation methods, plan and supervise agents' work, resolve problems encountered, and elaborate monitoring reports.

**2- Stock Farming Groups (pigs)**

The plan was to work with the following groups each year:

- from 5 to 8 groups of breeders (50 to 60 households);
- from 8 to 10 fattening groups (100 to 170 households); and
- from 4 to 5 feed groups (40 to 70 households).
- 1.5 technicians supervised these groups directly. They also wrote the monitoring reports.

**3- Market Gardening Groups (Dry seasons crops)**

- From 2003-2005, 20 to 40 groups of 80 to 170 households received close support. Each agent was responsible for 2 to 4 groups (from 5 to 7 households per group).
- One technician supervised the agents' work directly.

One project staff member specialised in animation and communication techniques was mobilised in a crosscutting manner to provide support to these different teams.

### *Setting the Length of Work for Each Group*

Given the goal of reaching a large number of farmers in a fixed period of time, the decision was made to limit the length of support to one crop cycle (in Prey Nup, rice cropping has only one cycle per year, and accordingly the duration of work with the rice group was determined based on this cycle—i.e. a period of ten months, from May to February, including preparation time at the start and results analysis after harvest).





This principle was more difficult to apply to the livestock farming groups because of the diversity in the age of the animals belonging to group members and, thereby, the lack of synchronisation in the activities to conduct on each farm. For the fattening and breeder groups, the duration of support was respectively 4 and 6 months. This covered the most critical periods for these systems (for fattening groups, the start of rearing when the piglets weighted 15 to 40 kg; and for breeder groups, when sows were in heat and during piglet weaning). The group members had to take part in all stages of the cycle, even though they did not all have animals on which to apply the recommendations as they went along.

The duration of support for market gardening groups was in function of the crop cycle, and therefore varied according to the type of produce.

The work with the toxic element removal groups, however, needed to be spread over several consecutive years because removal of these elements is rarely effective in one single operation and toxicity problems vary according to the climatic conditions during the year (notably the length of the dry season). In this case, the support provided was more sporadic throughout the year (when there were abundant rains in the polder, before working the soil, before transplanting) and did not require many agents and technicians to be mobilised. Above all, these groups needed to remain very informal while simultaneously maintaining their mobilisation capability beyond the duration of the project and being able to re-form when an extended dry season would increase the risk of being faced with toxicity problems in the low-lying acid sulphate soil areas.

### *Setting Up the Monitoring and Assessment System*

This monitoring system aimed to make it possible to assess the effects of the dissemination.

The system consisted of measuring, among farmers, specific indicators of how well the technical advice had been adopted during the year in which they took part in the group and then monitoring these indicators once they were no longer accompanied.

Among other things, the rice yield monitoring system set up by the project over approximately 1,300 plots (independently of belonging or not to the groups supervised by the project) provided not only an annual vision of "average" rice production performance in the polders, but also snapshots of farmers' practices year after year (in addition to collecting samples, this system also gathered information on technical itineraries).

△ *Yield monitoring: harvesting a "mini-plot" within a plot in polder 2 (December 2003)*

## Methodology, Progress Groups

The Prey Nup project's progress groups were very informal. Their duration was limited to one crop cycle, and they were mostly an extension tool with support for the application of technical advice. To a certain extent, these groups were also an action-research approach because monitoring and collective analysis of the results obtained was included in the process of defining or adjusting recommendations. There were three different categories of progress groups, in function of the sub-sectors on which these groups worked.

- Rice Progress Groups
- Pig Progress Groups
- Market Gardening Progress Groups





These three types had different operating modes, in function of the objectives and specificities of each of the activities concerned.

### ▪ Set Up Mechanism

In principal, the progress groups contained approximately twenty farmers, all of whom were volunteers that met a certain number of criteria (availability of necessary resources, notably a plot to cultivate in the polder zone, adhesion to the group's operating principles, and compliance with the collective rules necessary for proper polder operation—notably payment of the service fees owed to the polder users' organisation).

Each group was represented by a group leader who was often one of the "experimenting farmers" that had worked with the project during the first phases, or a former member of one of the previous years' groups. However, for the livestock farming progress groups, the project team preferred to allow the members of the groups to choose their group leaders based on their motivation and vitality.

The project set the criteria to select members and contacted the group leaders to explain the procedure to follow to set up these groups. It helped the group leaders spread information on the establishment of the group and where members could join.

The project ensured the group leaders that they would receive support in response to unknown technical difficulties likely to arise. In addition, the project committed to supervising each farmer individually (1 to 2 visits a year?) so as to answer the farmers' technical questions that had remained unanswered. This individual supervision also made it possible to anticipate or react to new situations resulting from the practices or specific context of the farmers concerned. In this way, the group leaders were supported in their role as advisors.

Progress Group Creation Criteria

| Thematic Group | Number of Members | Project's Role | Group Leader | Group Members |
|---|---|---|---|---|
| Rice Progress Group | Maximum of 20 | Select the group leader to register members that meet the set criteria. Inform villagers of where they could join the group. | Experimenting farmer or former member of a progress group. | Farmers located in the same village or in 2 adjacent villages. |
| Pig Progress Group | Maximum of 20 | Contact motivated and dynamic farmers in the field to inform the creation of the thematic group in their villages. | Motivated and dynamic farmers chosen by the group members. | Farmers in a village interested by the subject. |
| Market Gardening Progress Group | Maximum of 20 | Select the group leader in function of the crop to register members that meet the requested criteria. Inform villagers of where they could join the group. | Experimenting farmers or farmers with experience in market gardening. | Farmers in the same village as the group leader and interested in the crop. |

## ▪ Operating Principles

### *Group Leader Capacity Building*

All the farmers in the polders had their own rice cropping experience, and there was a degree of homogeneity when it came to mastery of the subject. However, the level of knowledge and experience among farmers was more heterogeneous when it came to livestock farming and market gardening.

This was a fundamental difference, which was taken into account when defining the objectives and working methods within the progress groups.

In the rice progress groups, the group leaders' function was above all that of interface between the project and the group members to facilitate the organisation of meetings and the transmission of information. They were not, however, the primary vector for the transmission of technical information. Inversely, in the livestock farming and market gardening groups, the group leaders trained group members directly and provided them with technical assistance (especially for market gardening), while also having a project technician as a reference. Given the importance of their role, the





group leaders received specific training on both technical aspects and animation methods.

### *Group Operation*

At the start, the groups and the project team identified the key phases of the crop or stock farming cycle, and established a work calendar based on these key phases. Before each of the important phases of the crop (or livestock) cycle, meetings were organised to discuss the modalities of implementing this stage. The meetings were then followed by support for the group members in putting these modalities into practice.

The work within the groups was divided into 6 major stages:

a) organisation of the meeting to set up the groups;

b) meeting to identify problems and training subjects;

c) assistance implementing advice;

d) monitoring and assessment system;

e) group result reports; and

f) organisation of visits.

(Stages b, c and d could be repeated at several stages in the crop or livestock cycle.)

### *Organisation of the Meeting to Set Up the Groups*

The project contacted the group leaders to determine the date and place of the meeting. The group leaders invited all the members to attend the meeting (or, if needed, suggested that the meeting be rescheduled).

### *Meeting to Identify Problems and Training Subjects*

The project agents (rice group) or technicians (pig group) prepared all the tools for the training. They ran the meetings in compliance with the following sequence:

- identification of specific problems in a given cropping or stock farming phase (the next phase to be implemented in practice);
- identification of specific practices implemented by certain group members and that contribute to solving the problems raised or limiting their impact;

– introduction of the project's advice to supplement the members' practices or improve the productivity and/or reduce risks of the production system; and
– training/additional advice for the members in response to individual questions.

In the market gardening groups, the meetings were run directly by the group leaders. They took place directly on plots and contained practical sessions during which the group leaders demonstrated the establishment of the crop (or crop maintenance operations) and had group members participate.

### Assistance Implementing Advice

For the rice groups, the implementation assistance was provided by the project agents individually to the farmers directly on their plots. However, for the pig groups, the advice implementation assistance was provided directly following the meetings, through demonstrations at one farmer's farm. The pig group's leader continued to provide technical assistance to the other members who asked him to do so.

The market gardening group leader provided technical assistance directly to group members during the key crop phases. When he was in doubt or could not answer questions directly, he would refer to the project technician.





△ *Practical training in growing maize in the village of Sre Knong (polder 1) in November 2003. For market gardening, the method was based more on a "relay farmer" approach. The crops were new and most of the group members had never grown them. In this case, discussions among farmers on practices, problems encountered and results cannot be a starting point in the dissemination method.*

### Monitoring and Assessment System

The project set up a monitoring and assessment system with the aim of tracking the major stages in the implementation of the recommendations issued by group leaders and by project agents and technicians in response to the problems encountered. The system also served to collect data on each group member's results, comparing them with the results of farmers' habitual practices (comparison based on control plots).

Monitoring and assessment data collection was generally based on a model monitoring sheet for each thematic group.

For the rice progress group, the monitoring was done directly by the project agents, whereas for the pig and market gardening groups, the group leaders did the monitoring.

### *Group Result Reports*

Each group's results were presented by the group leader with assistance from the project. The results were analysed, and summaries were written. These summaries were used to share the entire group's results with the members and discuss them. They were an opportunity to review the relevance of the technical options in function of specific conditions, notably by analysing successes and failures.

### *Organisation of Visits*

Visits open to all farmers (not members of progress groups) were organised at the end of the cycles (but before harvest or, for stock farming, sale of the animals) so that the visits would be as demonstrative as possible. This stage was useful not only for the dissemination of technical messages to farmers but also to make them aware of participation in the next season's progress groups.





Responsibilities of Various Actors in Running the Progress Groups

| Groups | Project's Roles | Group Leaders' Roles | Major Meeting Stages |
|---|---|---|---|
| Rice Progress Group | 1) Prepare and run meetings,<br>2) Provide individual technical assistance to group members,<br>3) Monitor implementation of technical advice by members and their results, and<br>4) Analyse the groups' results. | 1) Act as a relay between the group and the project, and<br>2) Invite members and help the project agents organise meetings. | 1) Early June to raise awareness among farmers of the interest to be found in group work and to discuss setting up nurseries,<br>2) Later in June to discuss transplanting, fertilisation and maintenance,<br>3) In October to discuss harvest and post-harvest operations, and<br>4) In February to assess the results. |
| Pig Progress Group | 1) Prepare and run meetings,<br>2) Train the group leader,<br>3) Demonstrate implementing the advice,<br>4) Provide members and in particular group leaders with technical support,<br>5) Monitor the technical assistance provided by the group leader to group members, and<br>4) Analyse the groups' results. | 1) Act as a relay between the group and the project,<br>2) Invite members and help the project agents organise meetings,<br>3) Provide members with technical assistance, and<br>4) Monitor implementation of technical advice by members and their results. | Fattening group (example):<br>-Raise farmers' awareness of group work,<br>-Pasteurellosis vaccination and 1st dose of vitamins,<br>-Plague vaccine (one week after the first meeting),<br>-Deworming (one week after the plague vaccine),<br>-Group leader meeting,<br>-2nd dose of vitamins (1 month after the 1st)<br>-3rd dose of vitamins (1 month after the 2nd)<br>-4th dose of vitamins (1 month after the 3rd)<br>-Identification of results before pigs are sold. |

| | | | |
|---|---|---|---|
| Market Gardening Progress Group | 1) Prepare and run meetings,<br>2) Train the group leader,<br>3) Provide group leaders with technical support,<br>4) Monitor the technical assistance provided by the group leader to group members, and<br>5) Analyse the groups' results. | 1) Act as a relay between the group and the project,<br>2) Invite members and help the project agents organise meetings,<br>3) Provide members with technical assistance,<br>4) Monitor implementation of technical advice by members and their results, and<br>5) Provide members with direct training. | - When preparing the soil and seed,<br>- Interview, before fertilising plants,<br>-Before harvest,<br>-Post-harvest results identification. |

***△ Visit to a plot of CAR8 rice, with the Tropeang Kea progress group (polder 6) in December 2003.***





### *The Issue of Subsidies*

In some cases, the cost of certain inputs for progress group members was partially subsidised. This was a way to strengthen farmers' interest in the progress groups and offset the sometimes constraining nature of belonging to these groups: in exchange, the participants were asked to follow scrupulously the protocols that had been validated by the group and facilitate monitoring.

In some cases, subsidies were also a way of reassuring farmers, when the recommended practices were seen as taking an additional risk (notably when applying the technical recommendations required additional investment although their economic impact had not been proven in advance from the farmer view). Examples: partial subsidisation of pig vaccines, or the construction of bunds.

**Example Subsidies Granted in the Prey Nup Project's Thematic Groups**

| Thematic Groups | Purpose | Nature of the Subsidy and Conditions | % of the Subsidy |
|---|---|---|---|
| Rice Progress Group | Disseminate technical messages to intensify rice cropping in the polders | Fertiliser (DAP and urea) on the condition that the technical recommendations were followed | 50% of the cost of the recommended dose of DAP (10 kg) and urea (5 kg) for a maximum of 20 ares |
| Pig Progress Group:<br>- Fattening Group | Disseminate technical messages to lower pig mortality due to common illnesses (pasteurellosis, plague) | Pasteurellosis and plague vaccines on the condition that the farmers had a pig sty, dewormed, and injected their pigs with vitamins | 50% of the cost of the vaccines (pasteurellosis and plague) |
| -Breeder Group | Disseminate technical messages to reduce mortality among young piglets | Pasteurellosis, plague and salmonellosis vaccines for sows and piglets on the condition that sows were dewormed and injected with vitamins and that the piglets received iron injections | 50% of the cost of the vaccines (salmonellosis, pasteurellosis and plague) |
| -Feed Group | Disseminate technical messages on feeding practices | Concentrated protein, vitamin and mineral feed prepared by the farmer on the condition that the recommended advice was followed | 30% of the cost of one kg of concentrated feed in the daily food ratio |
| Market Gardening Progress Group | Spreading diversified market gardening crops | Mushrooms (example):<br>Mycelium and lime on the condition that the techniques recommended for this crop were applied | 50% of the quantity of mycelium and lime needed for a 10-metre tray (5 bags of mycelium and 1 kg of lime, for approximately 1 USD per farmer) |
| Drainage Group | Demonstrate the effectiveness of the drainage networks and DAP in attenuating toxicity problems | DAP fertiliser on the condition that farmers dug small trenches and transplanted rice onto the drained plots | 1 bag of DAP for one hectare of land that had been drained |
| Bunds Group | Intensify rice cropping in the polders and improve the effectiveness of DAP, and lessen collective water management constraints | Fertiliser or money on the condition that the bunds conformed with the recommended technical standards | 1 bag of DAP + 20 USD, or 35 USD for 1 ha of land that had these bunds |





## *Group Entry and Exit Criteria*

Prior definition of member or group leader selection criteria was important to attaining the objectives set. Prior definition of exit criteria was also important. This made credible the conditional nature of the benefits of working in the group (and notably access to subsidies), and the need for everyone to "play by the rules".

**Examples of Criteria Chosen for the Prey Nup Project's Thematic Groups**

| Thematic Group | Entry Criteria | | Exit Criteria |
|---|---|---|---|
| | Group Members | Group Leader | Group Members and Leaders |
| Rice Progress Group | - Live in the polder<br>- Have a plot<br>- Not be a former member<br>- Pay the user fee (owed by all polder users) or have contractually committed to paying it | - Was an experimenting farmer for or worked with the project during the first phase<br>- Former group member and very dynamic<br>- Pay one's fees to the polder users' organisation | - Fail to attend the first two technical meetings (without a valid excuse)<br>- Not wish to remain in the group |
| Pig Progress Group | - Live in the polder<br>- Have pigs (or intend to start pig farming)<br>- Not be a former member | - Dynamic and chosen by the group members<br>- Attend the training provided by the project | - Failure to attend the technical meetings regularly |
| Market Gardening Progress Group | - Live in the polder<br>- Have a plot<br>-Not be a former group member for the same crop | - Farmer with good market gardening experience<br>- Dynamic and wants to share his experience<br>- Attend the training provided by the project | - Not attend the training provided by the group leader<br>- Not plant the crop |
| Drainage Group | - Live in the polder<br>- Have one or more plot(s) in the area affected by toxicity problems | - Same as for the members, but dynamic and chosen by the members during the initial meeting | - Not dig drainage trenches before ploughing and before transplanting<br>- Not transplant rice on the plot in question |

## *Group Duration*

The length of time the groups existed varied in function of the subject treated in each group. In general, the groups operated for the duration of one crop or animal

farming cycle. They were longer for the drainage groups (the purpose of which was not technical dissemination, but rather coordinating farmers in a given zone to conduct the drainage, a function that needed to be made sustainable).

The decision to adopt a fixed (and short) duration for the progress groups was justifiable with the aim of:

– being able to reach the largest number of people in the project zone and during the limited intervention time, and
– not lose time and wear out farmers' motivation once the primary accomplishments had been assimilated and applied.

## Attaining the Project's Objectives

### ■ Quantitative Objectives

The table below summarises the number of farmers affected by the project's intervention during the dissemination phase (from 2003 to 2006, or four years), individually or collectively. It also presents the impact that this dissemination method had on production in the zone.





| Number of Farmers Affected by the Project's Intervention | | Impact on Production |
|---|---|---|
| Individually | Collectively | |
| - 164 rice groups = 2,743 households (34% of all agricultural households)<br>- 85 market gardening groups = 545 households (7% of all agricultural households)<br>- 41 pig groups = 501 households (6% of all agricultural households)<br>- Drainage groups = 100 households (only in the polders most concerned: P2 and P3) | - Village meetings approximately 6,800 households (85% of all agricultural households)<br>- Agricultural fair approximately 18,000 to 23,000 attendees for the 3 fairs<br>- Water festival approximately 1,000 to 1,500 participants per year (since 1999)<br>- Exchange visits = 1,284 farmers | - Average rice yields: from 3 to 3.6 t/ha in the group; from 2.3 to 2.8 t/ha outside the group (control).<br>- The average annual difference in rice yields between these two groups is from 25% to 30%.<br>- Overall average yield for all the polders increased from 1.7 to 2.7 t/ha.<br>- 3,000 ha were re-cultivated.<br>- Annual paddy production grew from approximately 12,000 tons before the project to 25 to 28 thousand tons between 2003 and 2006.<br>- The number of pig farmers increased: from 35% of households in 1999 to 62% in 2006.<br>- 116 ha of land in the acid sulphate soil zones most susceptible to toxicity problems was the object of specific action destined to foster removal of toxic elements. |

## ■ Qualitative Objectives

| Thematic Groups | Modify farmers' practices |
|---|---|
| Rice Progress Groups | - Appropriate use of fertiliser at the most appropriate times<br>- Earlier transplanting dates in the polders<br>- Progressive move to more productive varieties (polders 5 and 6) that are more suited to the water management constraints in the polders |
| Pig Progress Groups | - Greater use of pig sties (rather than running free)<br>- Improved treatments for common illnesses<br>- Improved use of proteins in pig feed<br>- Improved breeds of pig to meet market demand<br>- Improved organisation for the sale of pigs |
| Market Gardening Groups | - Adoption of new crops promoted by the project, especially maize and agaric<br>- Better mastery of cropping techniques |
| Drainage Groups | - Improved removal of toxic elements in the start of the cropping season, in the low-lying areas with acid sulphate soils.<br>- Verification by farmers of the level of toxicity (by transplanting test plants) before fully transplanting all plants in plots likely to be affected by toxicity.<br>- Use of DAP to reduce the effects of toxicity and acidity in the low-lying areas |





△ ***Harvest in Tuol Totoeng (polder 3) in December 2005.***

## ■ Human Resources Mobilised in the Dissemination Phase

The human resources mobilised for this work are summarised in the table below.

| Groups | Yearly Results | Field Agents and Technicians Mobilised | Results per Agent or Technician | Supporting Technicians and Manager |
|---|---|---|---|---|
| Rice Groups (duration 4 years) | from 40 to 46 groups of approximately 800 households per year | - 12 field agents at ¾ time<br>- 1 rice cropping technician full-time<br>- 1 animator at ¾ time | From 3 to 4 groups of 17 to 20 households per field agent | a) 1 support component manager for:<br>- programme planning<br>- preparation of group and dissemination meeting content<br>- the technical plan<br>- preparation of monitoring slips and technical flyers<br>- analysis of results and preparation of group result reports…<br>b) The technicians and animators worked on:<br>- providing the agents with support preparing group and dissemination meeting tools<br>- supervising the agents' and group leaders' work<br>- collecting monitoring and assessment sheets… |
| Village Meetings (duration 4 years) | 3 series of meetings per year x 43 to 46 villages (for a total of 130 to 140 meetings). Approximately 1,200 to 1,800 attendees for each series. | | From 3 to 4 meetings for a total of 100 to 150 attendees each time per field agent (three times a year) | |
| Pig Groups (duration 4 years) | - From 5 to 8 groups of breeders for a total of 50 to 60 households<br>- From 8 to 10 groups of fatteners for a total of 100 to 170 households<br>- From 4 to 5 feed groups for a total of 40 to 70 households | - 1 technician full-time<br>- 1 technician at half-time<br>- 1 animator (same person as the rice group, for the remaining time) | From 17 to 23 groups for a total of 200 to 300 farmers for direct training provided by 1.5 technicians<br>From 17 to 23 group leaders received direct technical support from the technician | |
| Market Gardening Groups (from 2003 to 2005) | - From 20 to 40 groups for a total of 80 to 170 households per year | - 12 field agents at ¼ time (same agents as the rice group)<br>- 1 technician at half-time<br>- 1 animator (little time) | From 2 to 4 market gardening groups for a total of 10 to 15 households per agent | |





## Additional Dissemination Tools

The choice of communication materials and the quality of the tools used to disseminate messages was very important.

The tools used needed to make it possible to:

- provide participants with complete and precise information,
- ensure that farmers had accurately understood the messages, and
- draw the farmers' attention and raise their interest.

The project team needed to use the appropriate communication materials and create occasions to communicate and dialogue with farmers.

| Occasions and Events | Communication Materials |
|---|---|
| Progress Group Meetings | posters |
| Village Technical Dissemination Meetings | technical booklets |
| Agricultural Fair | quiz, question-and-answer game |
| Water Festival | agricultural competitions |
| | slide shows |

The tools above made it possible to inform the farmers widely of technical innovations to improve their cropping and stock farming systems. They could also encourage farmers to contact the technicians or draw their interest and encourage them to join the thematic groups.

During events such as the agricultural fair and water festival, the following activities were set up:

- the promotion of new local crops to make them known to farmers and shopkeepers in the area (for example, aromatic rice, maize, etc.);
- the promotion of agricultural products or services to create a trade relationship between shopkeepers or service providers and farmers;
- local agricultural product competitions (especially during the agricultural fair) to create an emulation effect around a message or new product; and
- the various question-and-answer games to get farmers to participate, create an arena for communication, and motivate the participants to pay attention to the content of the messages disseminated.

# Conclusion

The Prey Nup polder rehabilitation project accomplished its mission and closed its offices in the polder area in April 2007. After the project, some questions were asked, primarily on the sustainability of the technical messages disseminated and the agricultural services in the area.

## ▪ Sustainability of the Technical Accomplishments

The progress groups were informal groups created for the duration of one crop or stock farming cycle. After the project, the groups as such no longer exist, but the technical accomplishments to improve production systems adopted by the dynamic members of the groups will probably become part of their practices and know-how.

The dissemination of these technical messages attained a certain "critical mass" and can continue to be disseminated in a more informal manner among farmers that have family ties or closer friendships.

Over the long term, the fact that the production systems in the polder were little diversified is a factor that limits the "erosion" of these technical accomplishments.

## ▪ Farmers' Association for Local Development

In order to make the supply of quality paddy seed sustainable, the project helped farmers join together to produce and sell quality (certified) seeds to farmers in the polders. This producers' group has expanded its approach to the sale of rice for consumption, so as to diversify its sources of income and highlight the commercial interest of the varieties it produces.

During the past year, the group grew and began the procedure to obtain its legal registration with the Provincial Department of Agriculture.

It is important to continue to provide this association with support over time, as it has the advantage of working in the zone and requires only occasional support in technical fields or on questions pertaining to its administrative and financial management.





The Provincial Department of Agriculture is a good partner to support this association over the long term. The work done by this association coincides with some of the programmes developed by the department in the zone. For the Department, it is advantageous to support this existing organisation whose accomplishments are already significant.

## ▪ Continuation of Certain Services by the Local Government

During its implementation, the project recruited villagers to fulfil the function of field agent and benefited from the collaboration of technicians from the Provincial Department of Agriculture. These skilled people who have established a trusting relationship with the villagers in the polders remain present in the zone beyond the duration of the project. Their knowledge and local roots deserve to be preserved and optimised in the future.

It would be useful to set up systems to foster the preservation of these relationships and stimulate exchange and collaboration among farmers, former project agents and technicians. Continued support from local government offices is recommended in particular for:

1) Mobilisation and coordination of drainage groups. Intervention by the Department of Agriculture offices will probably remain necessary to reactivate the drainage groups in years when the risk of soil acidification is strongest (long and severe dry season).

2) Intervention in the case of phytosanitary problems (or sanitary problems for stock farming). If insects attack the rice crops or an epidemic breaks out on stock farms in the area, the communication between farmers and technicians must be rapid. Early warning of these attacks is a condition on which the effectiveness of the Department of Agriculture's intervention relies and makes it possible to limit the size of the zone affected by these problems and make best use of the Administration's (limited) resources. The project also worked towards this, to lay the basis for an efficient information transmission system. This system needs to continue to be run and improved.

## GRET

GRET (the Research and Technological Exchange Group) is a development organisation created in 1977 in France.

GRET has been active in Cambodia since 1987 in several sectors: agricultural and rural development, irrigation, agricultural training, microfinance and micro health insurance, essential services (water, energy, sanitation), and urban social development.

GRET intervenes in the framework of field projects that are conducted in partnership with local organisations or aim to support the creation of and capacity building for new institutions. GRET places particular emphasis on analysing and documenting these experiences and on communication for development. It also intervenes by conducting studies, running networks, and contributing to the elaboration of public policies.

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From 1998 to 2007, the French Agency for Development (AFD) financed the Prey Nup polder rehabilitation project (Sihanoukville, Cambodia) that was placed under the contracting authority of the Ministry of Water Resources and Meteorology (MOWRAM). This investment allowed hydro-agricultural infrastructures to be rehabilitated and thus protect approximately 10,500 ha of rice fields from the entry of sea water, and regulate the water level in this area.
Throughout this period, the Research and Technological Exchange Group (GRET) was entrusted with forming and supporting a users' organisation (the Prey Nup Polder Users' Community) which, today, in partnership with the MOWRAM, manages this infrastructure, and with implementing an agricultural development support component that, notably, made possible the re-cultivation of approximately 3,000 ha and doubled rice production.

This paper aims to analyse and document the project's experience with this last component. It offers a retrospective and critical examination of the actions conducted to find technical references suitable in this environment and for the farmers' situations, and disseminate these technical messages to those farmers.

This review of the project's experience aims to be succinct and is designed in priority for Cambodian professionals involved in agricultural research and extension.



GRET