CHAPTER XIII

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This ComMod experiment was conducted to improve the understanding of the interactions between land /water and labour migration through the co-design of an ABM with local RLR farmers in Ban Mak Mai village, Ubon Ratchathani province. Key associated tools, such as RPGs and ABM, produced during this ComMod process, were used to facilitate co-learning and to enhance the capacity of expression of the diverse field collaborators. There was no explicit conflict of resource use in this case study. Consequently, no attempt to facilitate a collective decision-making process over the issue being examined with the stakeholders was implemented. The focus was on achieving a joint understanding of the complex system under study.

In this case study, the legitimacy to start this highly interactive co-learning process may be criticized because there was no realistic perspective on attaining concluding decisions and action bearing concrete benefit to the participants. At the origin of this ComMod experiment, there was no clear demand from the local stakeholders or decision-makers at a higher level. Although the issue examined is widely recognized as an important one impeding rural development in this area, this ComMod process was exclusively initiated by a research team interest and its length was due to the long process of this doctoral research. The discussion is made of 2 parts and deals with initial diagnosis and ComMod phases, with special interest on stakeholder involvement throughout this experiment. The conclusion and recommendations follow at the end of this chapter.

13.1. Initial Diagnosis Activities for Preliminary Analysis and Field-based Knowledge Acquisition

13.1.1. Preliminary Synthesis/Diagnosis and Data Collection

This phase comprised the literature review, analysis of recent agricultural transformations, and farm survey to produce a household-based APS typology. As previous experiments on the management of upper watersheds of Northern Thailand have shown (Barnaud, Trébuil et al., 2008), this study found that initial diagnosis activities were essential for the researcher to understand the system especially the key question to be examined, get used to key informants and avoid possible pitfalls, in

particular the balance of different stakeholders involved and their power relation prior to launch the ComMod process. In this case study, these preliminary findings were very useful to select the study site and the participants, to provide a baseline for ex-post evaluation, and to build the initial conceptual model.

Many invited participants did not join in the first RPG session in July 2005, since they were busy in their paddies. I had to find new participants and replacements were selected based on the farmer typology. This unexpected event challenged my preliminary findings because 7 out of 11 farming households participating in the first RPG session were not the same ones whom I regularly visited before launching my ComMod process. But their behaviour and actions during the gaming session showed that decision-making processes of farm belonging to the same farm type were not different. However, this event made objectives of the activities unclear to these new participants. Besides, a better-off farmer (sub-type C) did not join this RPG session as well as the following ComMod activities as planed. The absence of expected participants could indicate that more intensive sensitizing activity should be carried out to clarify the objectives of activities, and to increase participants' interest to take part in the collaborative modelling process. Besides, the date to organize the first RPG session was also a reason for this unexpected event as many farmers were preparing their paddies in the early part of the rainy season. Even if local farmers agreed on the workshop dates, they finally decided to work in their paddies since successive rainy days had occurred just before.

13.1.2. Study Site Selection and Types of Participants

The choice of this single village to carry out the ComMod activities could also be criticized as it could not represent all farming situations in the Lam Dome Yai watershed. However, taking into account that this large village has a relatively extensive diversity of farming units as shown in previous on-farm studies, the absence of explicit social conflicts that could complicate the process, and the local logistical constraints, this choice was considered as acceptable. Being driven by a dominant diploma training purpose, a wider range of stakeholders was not made. But representatives of the local TAO administrative body, agricultural extension service, and NGO attended the first RPG session as observers. No attempts were made to

involve them more actively in the subsequent activities. The local extension worker suggested to invite representatives of several public organizations to take part in this ComMod process. But the choice was made to work with the villagers first, and to let them decide when and who they would like to invite to take part in the process. But, in this case, only migrant workers were suggested by participants since they would like to share their representation with the returned migrants. No suggestion to invite representatives of states' agencies was made. It was due to the fact that the participants did not feel that the issue being examined was so explicitly problematic to their livelihoods that they had to share with other stakeholders to find solutions. Therefore, only the diversity of local farmers was taken into account.

Nevertheless, the husbands and wives representing the different categories of RLR growers in the village were invited. This decision made was based on the fact that many strategic decisions at the farm level are made either by the farmer or his wife, or are discussed between them before a final choice is made. Culturally, Issan people give a high level of decision-making power to the wives in the management of the farming, social and economic activities. As seen in this ComMod experiment, the female participating farmers tended to dominate the proceedings and led lively discussions during gaming and plenary sessions.

The drawback of less diversity of stakeholders involved simply limited the diverse representations integrated in the model. As a result, the boarder knowledge base that participants were supposed to perceive through the knowledge exchange activities was not reached. However, if more diverse stakeholders involved had made available, the model produced would have been more complex, and needed longer implementation. Besides, it would have been difficult and very time-consuming to get the collective agreements on parameters and their values once the model was being fine-tuned with more stakeholder diversity. Or, it might even be impossible to co-construct the model with them.

13.2. ComMod Process in the Lam Dome Yai Watershed

13.2.1. Knowledge Sharing Activities

As several previous ComMod experiments have shown (Trébuil et al., 2002), this study found that the non-threatening and playful atmosphere of knowledge sharing

activities (RPG and ABM simulation sessions) triggered lively discussions on topics people usually did not talk about. Indeed, it is quite surprising to see that farmers living in the same village usually do not have such opportunities to share their farming experiences and reflect on them. However, this emerging communication platform was only temporary because nobody was in a position to take over to continue this kind of activity in the village. Even if the group of farmers seemed to enjoy these activities, they did not develop a stronger network among them due to the lack of interdependency among the villagers with regard to the issue being examined.

Although all the organizational and technical aspects (schedule of activities, conception of the tools, etc.) were decided by the research team, the key tools used in this collaborative modelling process were not difficult for participating farmers to understand because, they mentioned, these tools represented their current farming situations. As a result, they quite naturally engaged themselves into the model design and model use phases.

13.2.2. Tools Developed and Used through the ComMod Process

13.2.2.1. Role Playing Game (RPG)

The participatory modelling workshops using RPGs were not prepared to facilitate the communication among participants. These RPGs were mainly designed to validate and improve the research team's knowledge regarding RLR management and labour migration practices. As a result, few interactions among the participating farmers were observed during the gaming sessions. But, more lively discussions occurred during the following plenary sessions. Particularly, when a gaming session was replayed by computer simulations, participating farmers could observe and comment other players' actions during the gaming session. During the evaluation, silent participants as well as talkative ones underlined the importance of these discussions as a way to exchange experiences, ideas and opinions in a well-structured way facilitated by a researcher. After these plenary discussions, people were still eager to continue to debate at home, with friends, but also beyond their usual social circles. However, several old participants encountered difficulties to engage in RPG sessions. Though it would require more time and other resources, the ComMod approach could have been more effective if more attention was paid to the participants having difficulties to get

started. In addition to stimulate farmer communication and learning, RPGs were used to achieve two purposes: (i) validation of the conceptual model and (ii) farmer preparation for consecutive ABM simulations.

13.2.2.2. Ban Mak Mai Agent-Based Model (BMM model)

The convergence of logic, values and preferences between the research team and the participating farmers increased along the ComMod process, particularly when the process shifted from RPG sessions to the co-construction of the BMM model. Incorporating decisions and actions made in RPGs into the ABM increased the degree of contextualization, comprehensiveness and confidence, and participating farmers' comfort to use the model.

Different organization of farmer groups to co-design the BMM model

Because participants have different levels of knowledge and education, some of them could not quickly anticipate the consequences of interactions in the BMM model, and were influenced by others during discussions in large heterogeneous groups. It is also difficult for the research team to validate a model in group discussions with very diverse decision-making processes across farm types. In the small and more homogeneous groups, participatory simulations sessions generated critiques from farmers on the model more easily. They felt more comfortable to exchange experiences and doubts, focus on issues of personal relevance, and put more effort in learning about the issue at stake. They were also better prepared to address their concerns, visions and arguments once returning to join a larger group of diverse participants. Besides, the modeller could easily clarify key model parameters and precise their values within small groups of homogenous farmer belonging to the same type. However, the participatory simulations with all farm types were also important to examine interactions across types, particularly regarding hired labour management. This study found that the use of different groups of participants for model building provided complementary advantage and a more efficient way to construct and fine-tune the BMM model.

From realistic representations of actual households to the abstract concept of the Ban Mak Mai virtual farms

The first ABM (the LDY model) was introduced to the participating farmers in a workshop organized in April 2007. The LDY model represented the exact circumstances of the 11 households who participated in the process. During this workshop, I had difficulty to stimulate knowledge exchange to refine the model, and to get a collective agreement on the validation of this complex model. Therefore, the LDY model was simplified as shown in the latest version of the BMM model described in chapter X. Although this latest version is more abstract than the first one, it was accepted by all the participating farmers who considered that it sufficiently represented the interactions between land & water use and labour migration in their village. I also found that the abstract representation could avoid the above-mentioned difficulty of asking for always more realism in the representations. The participating farmers acted like a group of RLR experts to assist computerized agents to produce rice. More lively discussions occurred and better model refinement was achieved.

Validation: a shared representation of the interactions between land & water use and labour migration

Validation relates to the extent to which the model adequately represents the system being modelled (Casti, 1997). According to the ComMod principles, the BMM model was built through the confrontation of the views of different types of stakeholders and the views of the researchers in order to clearly simulate scenarios built to explore the opportunities and dangers of an uncertain future (Moss, 2008). As a result, I found that participating farmers were able to identify and explore their scenarios of interest during computer simulations in May 2008 (see details in chapters VIII and XI). Such field activity was a proof of model validity accepted by participants. As a result, the participating farmers were comfortable and confident enough with the BMM model to present and comment this model in front of master students and scientists at the local university who did not participate in this modelling process during a special seminar at Faculty of Agriculture of UBU (see details in chapter VIII). However, the discussion followed the demonstration in the special seminar showed that most of the students had different views and understandings and

even concepts about RLR farming in northeast Thailand. This confirmed the fact that any model might be an accurate representation of some stakeholders' views, but at the same time, an inaccurate (though precise) one for other differing stakeholders' views (Moss, 2008). Nonetheless, this collaborative modelling practice is valuable because of its efficiency in communicating and therefore sharing such diversity of viewpoints.

13.2.2.3. Cost & Benefit

The designing process was long and costly, with only a very local impact so far. This inescapably raises the question of the cost-benefit of the whole approach. A couple of key events occurring in the village each year were insufficient to maintain a good momentum in the interactions between the research team and the local RLR farmers. Many factors dealing with the academic work of a Ph.D. candidate and the limited time available for collaborative gaming and simulation activities of the participating farmers impeded a faster implementation. As a result, I could not organize the workshops in the periods of peak labour demand in RLR production. The field workshops, especially for RPG sessions, were held mainly in April –May, just before RLR crop establishment, and again after transplanting and before harvesting in August or early October.

The RPGs sessions were definitely needed in this case study because it proved that they could offer lively discussion, inclusive outputs and prepare the participants to be ready to use the more challenging ABM tool. But, the preparation and organization of RPG sessions were costly. Once the BMM model was used as a knowledge sharing platform instead of RPGs, I could organize more interactions with farmers (4 times within 6 months) with less time needed to prepare them and to spend with participating farmers (usually half a day per workshop). Future ComMod sequence on this topic could be faster if the main tool used with the recent participating farmers is still the BMM model. Based on the ex-post evaluation, the participants said that they needed to learn the structure and operations of ABM through, at least two RPG sessions. Therefore, the RPG session may need to be organized if there is involvement of new participants.

13.2.2.4. Ownership of Tools and Process

The ownership of the process by the participants is still limited because they were not independently able to select the focus of the process and its successive phases. But, from the first RPG to the BMM model, there was a clear increase in the influence of participants' opinions and suggestions on the tools produced. Several of them suggested relatively major changes in the BMM model. For instance, the rules for nursery re-establishment once the first one failed were modified as suggested by participants. It was clear that the participants felt that they partly owned the BMM model and comfortably used it to communicate with other people like during their special seminar at UBU. Nevertheless, none of the participants was trained to be a ComMod practitioner in the village. As in a previous study (Barnaud et al., 2006), this study found that because of the participants' primary education level, it is not possible to transfer the conception of gaming activities and the computer modelling competences to such local actors. This concern about finding an autonomous and neutral local facilitator, who can continue to use the ComMod methodology and develop tools, remains a challenge.

13.2.3. Types and Number of Stakeholders Involved in the Process

ComMod is one of the alternative approaches used to facilitate communication because it motivates and engages all kinds of people in collective exchanges. Therefore, a greater variety of players involved in the ComMod activities is preferable. In this case, even if I established regular contacts with staff members of development-oriented institutions at the study site, there was no continuous presence of the project at the site. It was not possible to involve all of them throughout the successive model design phases due to several factors, in particular time constraints of the TAO officer and agricultural extension worker.

Due to limited space, time and equipment for players, 21 participants were considered suitable for RPG sessions in this ComMod experiment. During the BMM simulations, the number of participants was similar than in previous RPG sessions. But, I found that it was possible to use the BMM model to engage more participants in the same group discussion as shown in the special seminar given at UBU where more than 70 participants were involved.

13.2.4. Further Use of the BMM model

Based on the results from monitoring and evaluation activity, new ComMod activities focusing on market opportunities for farm products, and farm diversification out of rice in relation to water availability would certainly meet the interest of these collaborative farmers. However, integrating agricultural marketing dimension into the BMM model would require considerable time and the assistance of an economist but it could be proposed as a further sequence of this ComMod experiment. In term of out-scaling, the current model can be used as a communication tool in villages similar to Ban Mak Mai village to stimulate knowledge sharing, leading to the enrichment of the underlying conceptual model. I believe that the computer model could be introduced straightforwardly to other farmers without being perceived as a "black box" if its presentation is made by the BMM farmers themselves: there is no reason why the communication of the model among farmers would be more problematic than the communication of the model from farmers to scientists.

13.3. Conclusion

From this ComMod experiment, our understanding of the interactions between land/water use and labour migration across farm types is improved through the evolving iterative collaborative modelling process with marginal rice farmers. We both researchers and participating farmers gained benefits through knowledge sharing. The initial diagnosis activities elucidate respective strategic decision-making processes regarding farm management and labour migration practices across farm types. This preliminary and field-based knowledge is very useful to design the initial conceptual model representing the structure and interactions of the components of the system under study. Based on the initial conceptual model, the RPGs and co-construction of the BMM model with local farmers lead to the creation of a common understanding and shared representation of the interaction between land/water use and labour migration.

The conceptual model is gradually enriched through the design and use of RPGs and co-construction of ABM. Using associated tools, RPGs and ABM, can stimulate knowledge sharing, and open a way to integrate scientific and indigenous knowledge between scientists and the local farmers with primary educated level. The

participating farmers are capable to use RPGs and ABM to express their representations, to facilitate their collective assessment of the problem at stake, and to improve their coordination through the collective identification, simulation and assessment of scenarios of change. At the individual level, participants adopted a more reflective, pro-active style of farming, gained confidence in managing changes, communicated across broader social networks, etc.

Through the co-learning and knowledge sharing during series of participatory workshops, participants' adaptive management capacity was also generated. New ideas on how to improve the local agro-ecosystem also emerged, like the adoption of mixed farming and the complementary use of underground water. Some participants even declared having changed some of their farming practices as a result of this learning and exchange collaborative modelling process. The participating farmers can use the BMM model to discover the consequences of water dynamics interacting with fluctuation of labour availability. While the gaming sessions are more inclusive, the computer ABM-based participatory simulations are obviously more difficult to follow for the older farmers. This ComMod experiment enabled farmers to gain knowledge about individual farm practices. The interviews show that participating farmers think that they benefit at the personal level, especially by triggering individual learning, reflection and action about farm activities. The ComMod approach is very robust and efficient in its resemblance to reality, the fun, stimulating openness and exchange of experiences, while showing relationships between farm actions and their consequences.

13.4. Recommendations

13.4.1. On ComMod Process

Based on this ComMod experiment, there are suggestions to improve the process regarding the process management, and tools used.

13.4.1.1. Process Management

Involve diverse stakeholders as early as in problem formulation

More diversity of stakeholders, in particular local policy makers, is needed to integrate more diverse perceptions in this co-learning process. It is also to offer them

to learn an alternative participatory approach to facilitate knowledge exchange between them and villagers. The selection of problematic issue should be legitimated by stakeholders and formulated with them. Taking these concerns into account can help to intensify the ComMod sensitizing activity. Clearer objectives to targeted participants prior the ComMod process can also be reached. The participants' age is specifically addressed in this case study. Elderly participants had to experience the RPGs at least two times before engaging themselves into participatory simulations. However, younger players immediately understood the ABM because they have higher educational background with experience in RLR management and computer uses.

Balance stakeholders' understandability and tediousness through repeated simulations

To ensure that local farmers had clear understanding about the model, the research team often repeated same simulations for a long time. The participants may sometimes be tiresome For example, an elderly man and woman of farm type A told me after they participated in the 24th April 2007 field workshop that "I feel that participating in this field workshop was similar to the last three workshops, it becomes repetitive and I did not learn new things" (Thongnoi, 2009). However, any change to increase participants' interest has to be carefully and collectively selected to avoid possible drawbacks, particularly individual subjectivity.

13.4.1.2. On Its Main tools Used

Role playing game

A RPG should not be very complicated with many steps to complete its session. The complicated RPGs may require some computer-assisted game plays, such as EXCEL spreadsheets and it, hence, necessitates to have assistants to help players. As a result, the players could sometimes be passive in the gaming session if they have to wait too long during inputs and output procedures operated by assistants. A simple RPG with few steps like the third RPG in October 2007 is more effective to always engage players into a game session. Besides, with more graphical pictograms used, and without use of computer-assisted game play, it is possible to design a RPG

that allows the players to actively manage inputs and outputs by themselves. This kind of game design can keep the players focusing on the content of the game with more lively interactions.

Agent-based model

Based on the ex-post evaluation, experiencing and understanding the RPG's features and rules is an essential learning stage for new participants prior the use of an ABM. However, the pictograms used in the ABM has to be similar than those used in the RPG. The spatially-explicit representation in the BMM model is very helpful to support group discussions. But it has to be designed to present in a large size with high contrast and clear colours related to reality (e.g. deep blue for farm ponds) to be easily observed by all participants.

13.4.2. On Water Resource Development

The participating farmers confirmed their preference for the individual private water resource development, such as farm ponds and artesian wells. They see them as more feasible and practical. They do not reject an irrigation net work or public reservoirs but there are concerns about the equal access to these water resources for all types of farmers. They are also aware of water sharing conflicts that could emerge from unfair public water resource management and this could jeopardize the harmony of their village. The participating small farming households seem to be more pro-active to use any new water resources to diversify their farm production. They need more labour force to do so. Thus, they are likely to reduce the number of migrant workers if adequate water is made available. Such action may increase labour constraints on medium and large farms since hired labour from their main source would be less available. Thus, more water resources may not change their farming strategies to use it as much as expected. An important remark made by the participating farmers is that they would like to involve in local development prior to its implementation to avoid any pitfalls that may occur.

However, using the results derived from this experiment to improve the design of more adaptive future water management policies is still questionable because no policy maker was involved so far. Thanks to the up-scaling capability to reuse the BMM model by participating farmers, it is possible to engage local policy

makers into a group decision. Besides, the BMM model can be used for out-scaling purpose if it is presented to other RLR farmers whose SAES is similar than the Ban Mak Mai village. This is also a way to steadily update the BMM model with local farmers. If the up-scaling and out-scaling are proposed, continuing this ComMod process is recommended to update and improve my understanding about the current situation with my field collaborators. This may lead to more concrete recommendations regarding possible future development derived from the collaboration between local farmers and other relevant actors.