Rethinking participatory action research in renewable resource management

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Due to the work of Funtowicz and Ravetz, agricultural scientists increasingly recognise the high complexity, diversity, uncertainty, and the high stakes involved in Renewable Resource Management (RNM). Ecological systems as well as social systems are dynamic and interact at various system levels leading to highly complex, non-linear, divergent processes and the emergence of new phenomena. These system dynamics cannot be controlled so adaptive management is needed: reflexive social systems are able to learn and co-evolve in a self-organising manner. Agricultural scientists are called to engage in participatory action research because system dynamics are uncertain so the knowledge difference between scientists and lay people is less relevant, local people have more contextual knowledge about the specific system dynamics, and local people's livelihoods depend (partly) on renewable resources so they have high stakes in the research and the identified solutions. More and more agricultural scientists respond to the challenge and develop methodologies for information sharing and learning such as participatory mapping, participatory scenario analyses, etc.

The key question is: do these efforts actually lead to the intended effect of adaptive management: reflection, self-organisation and institutional change for more sustainable and equitable use of renewable resources? To answer this question, a participatory role-playing-game and simulation experiment, implemented by Companion Modelling (ComMod) practitioners in northern Thailand was studied. The applied methodology, the espoused- and tacit theory-of-change are described based on ComMod documents and articles. Analysing the results with the participants and the designers, it is concluded that the methodology and underlying theories were insufficient to achieve the intended effect.

The ComMod approach primarily focused on learning: the exchange of perspectives to attain a rich picture and mutual understanding. This learning, coupled with the participatory, iterative and multi-level character of the process, was supposed to trigger inclusive negotiation and decision-making. Interviews with the participants revealed that, at the individual level farmers learned about farm and ecological dynamics. Instead of copying other people's farm strategies they now reflect on, and try, new farm practices and strategies. The games and simulation models stimulated mutual understanding and cooperative thinking about collective problems. However, the 12 participants noted they were not able to transfer these insights to fellow villagers. People needed first hand experience with the ComMod activities to attain similar insights. As a consequence, village level decision-making did not attain the critical mass and momentum needed for collective action. Meanwhile, higher-level administrators/politicians avoided involvement and commitment to the local level learning process. To create change, people have to effectively deal with competing interests, discourses and power dynamics. The theories applied by ComMod did not provide adequate guidance. When launching a participatory action research, process designers need to pay attention to aspects such as empowerment, mobilisation of constituencies and coalitions, and multi-level negotiation.

1 Introduction

This study deals with the action theory, the activities and the impact of a participatory action research in Renewable Resource Management (RRM). Current insights of post-modernism and decentralised governance of RRM prompt scientists to engage in participatory action research. RRM scientists start to develop methodologies for information sharing and learning such as participatory mapping, participatory scenario analysis etc. to create a rich picture of a local renewable resource problem; to look for both biophysical and cultural apt solutions; and to enhance the awareness, a sense of ownership, commitment and organisation of local actors for improved renewable resource management. The ultimate aim of these participatory action research projects is to enhance learning, self-organisation and the establishment of improved RRM (short term effect), as well as new societal 'learning and decision-making heuristics' for adaptive management (long term impact). But do these efforts actually lead to the intended effect? This study describes and analyses the action theory, activities and impact of Companion Modelling (ComMod) scientists engaged in participatory action research for RRM in a mountainous area of Northern Thailand. ComMod scientists embrace the post-modern concept of constructivism, complexity, learning and adaptive management. The question is whether the action theory and project efforts finally led to the intended learning, self-organisation, more sustainable, equitable RRM and new 'communication and decision-making routines'.

2 Agricultural scientists and participatory action research

From the end of the 1980s, when being confronted with the dislocating consequences of uncritical application of positive science and technology, the public started to loose trust in the competence of the scientific system and official authorities (Wynne, 1992; 1993; Irwin, 1995). Up till now, science finds itself in a crisis of legitimacy and confidence, and scientists increasingly recognise that 'normal science', its reductionist, puzzle-solving approach, is not able to adequately tackle socio-ecological management issues, characterised by high complexity and high stakes. Socio-ecological systems consist of nested biophysical and human systems, which are highly dynamic and simultaneously interact at various system levels. This leads to complex, non-linear, divergent processes and phenomena. We cannot predict and control all related cause-effect dynamics, especially not the purposeful and reflexive behaviour of human systems. Funtowicz and Ravetz therefore called on scientists to adapt a posture of post-normal science, acknowledging (a) complexity and irreducibility of uncertainty and (b) the partiality and conditionality of scientific knowledge (Funtowicz & Ravetz, 1994a,b; Funtowicz et al, 1999). Now what does this post-normal posture entail?

Complexity thinking underscores the need for a holistic perspective. We cannot explain, predict and control a socio-ecological system by knowing its respective parts and processes. The whole is more than the aggregation of the various parts and the system effects triggered by a (small) change of action are uncertain and indeterminate. Complexity thinking therefore studies overall system dynamics, the capacity of resilience and the emergence of new phenomena. Besides their complexity, socio-ecological systems are also characterised by a large variability in biophysical, socio-economic, cultural and political properties. As a result, scientists cannot generalise and extrapolate knowledge from one case to another context but need to adopt a posture of open-mindedness, context-specific system monitoring, iterative learning and adaptive management (Holling, 1978). Constructivism recognises the partiality and conditionality of knowledge (Knorr-Cetina, 1981). Like all knowledge, scientific knowledge is partial and conditioned by the history of the scientific institutions,

their rules of good scientific practice and rigor in research methods. Science is not 'a purely objective, value-free activity of discovery', but a creative process in which social and individual values interfere with observation, analysis and interpretation. For instance, knowledge generated by agricultural scientists differs from knowledge of farmers who live, work and experience the socio-ecological system on a day-to-day base, and whose livelihood and identity are closely related to agricultural practices (Wynne, 1996). Hence, when dealing with complex socio-ecological systems, it is crucial to acknowledge the 'black spots' (ignorance) of scientific analysis and integrate other types of knowledge to get 'a rich picture' or 'socially robust knowledge' (Nowotny et al, 2001).

Integration of knowledge enables scientists to get a better overview of an issue, but also to focus more on the issues of relevance and concern to societal actors. The livelihoods and identity of many societal actors depend on renewable resources. They have high stakes in the knowledge production and decision-making. Agricultural scientists have a moral obligation to simultaneously consider the values and stakes of local actors, long-term societal concerns as well as ecological sustainability. Post-normal scientists, recognise the legitimacy of different perspectives, and engage in collaborative forms of knowledge production such as Mode 2 science (Gibbons, 1994; Nowotny *et al*, 2001)[1] and 'extended peer review' in all phases of the research process (Funtowicz and Ravetz, 1994).

The emergence of a post-normal epistemology can be considered part of a broader process of change in science, policy-making and regulatory activity. Many countries nowadays embrace the discourse of decentralisation and democratic deliberation (Pellizzoni, 2003). Especially in the domain of RRM, governments realise 'society is too complex to be steered in a centralised, unified manner'. Decentralisation of governance is hoped to solve this issue: (a) local renewable resource users have more knowledge about the local problem and technical, socio-political feasible solutions, and (b) when invited to the deliberations of facts and arguments (values) they regularly arrive at mutually satisfactory and binding decisions and cooperate in the implementation, monitoring and sanctions (Cornwall, 2000; Pellizzoni, 2003).

However, an assessment of the research approach of International Agricultural Research Institutes (IARC) revealed that the majority still applies consultative rather than collaborative research approaches (Johnson et al, 2000). For many researchers participatory research is still a means to obtain data on local people's knowledge and practices. Nevertheless, a majority of RRM scientists considered it essential to collaborate with local people on an equal footing (70%, Fernandez, 1999). Despite this different rhetoric, even in this field participatory action research processes are still a minority (Probst, 2003). This article describes and analyses an RRM project that does use a post-normal epistemology and reflects upon its strengths and weaknesses.

3 The selected case and the research framework

3.1 The case

Nowadays, quite some scientists in the domain of RRM embrace the idea of complex system thinking but only a minority really works from a constructivist perspective and collaborate with local people on an equal footing. Many agricultural scientists consult local stakeholders, but still frame the research in line with their scientific interest (Chambers, 1997). This is reinforced by the prevailing positivist epistemology and, amongst others, the

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[1] Mode 2 science is about trans-disciplinary science: generated by, and accountable to scientists **and** societal actors.

research funding procedures and prevailing scientific routines (Klerkx, 2007). This study focuses on researchers who do embrace the post-normal epistemology and opt for participatory action research. The ComMod project at Mae Salaep village in the mountainous area of northern Thailand deals with RRM research and is aimed at enhancing adaptive management so it fits the research criteria.

3.2 The analytical framework

Participatory action research means that researchers and local actors engage themselves in an open learning and negotiation or a, so-called, interactive innovation process. Interactive innovation processes have differing goals, affecting the process design. Those who value a representative democracy start an interactive process when they feel the solution of a certain problem requires the consideration of local knowledge and concerns. Those who value a participatory democracy engage in interactive processes to enhance awareness and the political influence of local citizens (Mayer *et al*, 2005). The latter prioritise empowerment. They primarily aim to ensure that citizens become aware, mobilise constituencies and coalitions and engage in advocacy for more equitable solutions and are ready to postpone or forgo short-tem solutions. Similarly, some researchers engage in participatory action research to find adequate solutions to new emerging socio-ecological problems, while others aim at the instalment of 'participatory learning and decision-making heuristics'.

Interactive processes are iterative in nature, so in most processes facilitators have to deal with the following facilitation tasks[2]:

1) *Preparing the process*: The facilitator assesses the potential of an interactive process. Conditions for success are: people have a certain sense of urgency about the issue at stake, people have a certain feeling of interdependency, people feel they have the authority, responsibility and power to act or induce change (Grimble & Wellard, 1997; Mitchell et al, 1997; Ramirez, 2001; Leeuwis, 2004). At times, people are not yet aware of the urgency of an issue, but the researcher judges that an issue deserves attention. In this case, the researcher must be able to demonstrate the importance of the problem and the impact it will have on people's livelihood (Dovers, 1995, van Paassen, 2004). Special care needs to be given to marginalized stakeholders, who are not always aware of their position and find it hard to articulate their interests and engage in public debates (Wollenberg *et al*, 2001). When the conditions for an interactive learning process are favourable, it is important to prepare the process and select dynamic, innovative stakeholder participants, with a wide variety of knowledge and interests, and with good communication skills. The latter capacity is essential for the communication of ideas generated by the learning process and mobilisation of constituency and key decision makers (Wielinga, 2001).

2) *Engaging participants to the learning and negotiation process.* Joint learning and negotiation processes have a cognitive-, affective/emotional and a process regulative dimension. Participants become engaged when they have a real interest in the subject; they enjoy the environment and feel the process will lead to a worthwhile conclusion (Vermunt & Verloop, 1999; Van de Kerkhof & Wieczorek, 2005). Facilitators have the task:

   a) To create space for dialogue and manage group dynamics. E.g. provide an inviting atmosphere, assure an open, balanced, creative and constructive discussion, reinforce mutual relationships (Kaner 1996). Marginalized people need extra space and support to really participate in public debates (Wollenberg et al, 2001).

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[2] The tasks are numbered for the sake of references. This does not mean the tasks have a specific order. They are interrelated, and sooner or later need to be attended to.

b) To facilitate an inclusive learning process that consists of learning about the subject; learning about each others' perspectives and interests or concerns about the on the subject; identifying a shared problem definition, goal and type of solution to look for; joint fact-finding about the details of potential solutions;

c) To manage conflicts of interests, enforcing progress in negotiation, agreement and action. A joint elaboration of process rules creates an atmosphere of mutual respect, a right of withdrawal for participants, and a necessary authority and power base for the facilitator to manage conflicts and enforce agreements (Leeuwis, 2000; 2004).

3) *Mobilising constituencies and key decision-makers*. Local change needs endorsement and support of other non-participating stakeholders and key decision makers. A change of local practices requires adjustment at the institutional level. (Röling & Woodhill, 2001; Groot, 2002; Leeuwis, 2004; Rajeswari et al, 2006; Dormon et al, 2007). Unfortunately, the transfer of the acquired insights to constituencies, local leaders and higher-level decision makers is problematic and often fails (Nooteboom & Teisman, 2003; Loeber, 2004). Multi-scale learning, negotiation and networking processes remain a challenge (Groot, 2002; Leeuwis, 2004; Giller et al, in press).

Depending on the goal and the context, researchers develop a certain action-theory and process-design, selecting activities to handle the various facilitation tasks.

3.3 The research method

As participatory action research is goal and context dependant, it needs an impact evaluation framework that pays due attention to the ideological and socio-political aspects. A reflexive evaluation was therefore used. Reflexive research implies a continuous iteration between various levels of concerns: the systematic confrontation of various kinds of empirical material, the awareness of the interpretive act, awareness of the political-ideological dimension, and the relative authority and relevance of the perspective of the researcher and the researched (Alvesson & Skölberg, 2000). In line with these principles, Fischer (1995) developed the critical reflexive evaluation, which not only focuses on the effectiveness of the intervention but also looks at the intervention from a wider social-political and ideological perspective.

The actual research consisted of an analysis of written narrative sources, interviews with the scientists and participants, as well as a continuous inquiry and reflection with the designing scientists. In the preparation of the evaluation, the designing scientists completed an elaborate project history line, with detailed information about the initiation of the whole project as well as all subsequent activities (specific objectives, action theory and assumptions, expected results, implemented activity and participants, triggered effect and personal appreciation). This elaborate account as well as all reports and articles written by the scientists served as input for the interviews and reflections. The scientists used to interview all workshop participants individually after each workshop session, to assess their learning and change of opinions. This provided insight in the evolution of perspectives and action. During the evaluation field visits in 2007, which was the basis for this study, interviews with the participants focussed on the activities and outcomes of the intervention. In the analysis the reasoning and activities of the action research team, the effects as perceived by the participants the literature on interactive innovation processes and the socio-political and cultural context of Thailand are confronted.

4 Results, ComMod activities in Mae Salaep

4.1 The action theory of ComMod

To assess the effectiveness, the societal fit and ideological choice of the ComMod intervention, we first need to know the action theory behind this intervention. What were their espoused and tacit theories and assumptions that guided their action (Argyris & Schön, 1996; Schön & Rein, 1994)? To get insight in these so-called theories-in-use, we examined the ComMod posture, the additional literature that inspired the ComMod scientists involved in Mae Salaep, the articles written at the Mae Salaep experience, and the elaborate report the scientists provided about the actions undertaken in Mae Salaep.

The ComMod posture

ComMod scientists embrace the post-modern epistemology and explicitly engage in Mode-2 science (Collectif ComMod, 2006). ComModians use modelling as a method to mobilise, question and structure scientific and experiential knowledge about complex socio-ecological system dynamics. Core activities of the ComMod approach are Role Playing Games (RPG), to attain a joint and rich picture of a complex situation, and Multi Agent Simulations (MAS), to collectively explore (long-term) effects of present behaviour and proposed future solutions. The underlying assumption of ComMod is that the joint exploration of actors' behaviour and of biophysical system dynamics gives rise to improved knowledge; to more effective dialogue about beliefs, values and interests; and support to inclusive negotiation for adaptive RRM. The ambition is not to produce decisions or final results, but to enrich the decision-making processes in terms of substance, e.g. knowledge about RRM systems, and/or communication e.g. better dialogue, empowerment, etc. (ComMod Charter, 2007: 3). ComMod comes into play upstream of the technical decision.

The ComMod charter clearly notes that ComMod is part of a process, but does not cover the entire decision-making process. However, in practice ComMod scientists regularly do initiate a local learning process for collective action, implicitly taking the responsibility to guide such a process to a proper, societal acceptable, ending. Within the ComMod community there is discussion about this responsibility and the stance that scientists can and should take. Those scientists who are the main driving force behind a joint learning process have to decide whether they primarily aim to enrich the deliberation about an emerging socio-ecological problem, or to support the development of new learning- and decision-making heuristics (Collectif ComMod, 2006). One line of argument within ComMod is to prioritise the development of new societal learning and decision-making heuristics, promoting participatory democracy that gives voice to the citizens, notably the poor and marginalized (Mayer et al, 2005). This ambition is still under discussion in the ComMod community. There is no clear action theory to guide the ComMod scientists in this respect. Each ComMod research team that starts a participatory action process develops its own focus and intervention strategy. The Mae Salaep project is one of the cases in which the researchers took the initiative for a joint learning process and felt attracted to the ideas of participatory democracy (Barnaud et al, 2006, 2008; Barnaud et al, in prep).

The applied action-theory

In 1996, a group of scientists started to develop the Companion Modelling approach (Bousquet et al, 1996; Barreteau et al, 1997). In 1999, ComMod scientists wanted to interest Asian researchers (and future development workers) in their approach so they decided to start a test and training project in Mae Salaep. Before, the village was the field site of a PhD research on soil sciences. It seemed convenient to use this scientific knowledge to start a joint learning and action research on soil erosion. The aim of the first cycle (August 2001-December 2002) was to test (a) whether it was possible to integrate the available scientific knowledge in a MAS model; (b) whether local actors were able to understand the RPG and model simulations; and (c) whether this enabled scientists and farmers to share and integrate

knowledge. When this turned out to be the case, the ComMod approach could be fully deployed. The ComMod team then focussed on: the mobilisation and sharing of knowledge *amongst* local actors. Scientists decided to drop the erosion issue of the first learning cycle, as farmers had indicated soil erosion was no longer a major threat. Farmers knew how to deal with this issue and increasingly invested in lucrative perennial crops. However, limited availability of money and water constrained the expansion of high value tea and lychee orchards. Farmers therefore proposed ComMod to jointly explore the credit (2nd cycle) and water situation (3rd cycle) and identify options for expansion (especially for the poor).

When analysing the process account of the scientists, they supported the local learning and action cycles primarily through the following activities:

1) *Preparatory diagnostic interviews (2-3 months).*
   Researchers gathered context specific information related to the issues of concern as suggested by the participants: an update of knowledge about farm systems and livelihood strategies, coupled with an analysis of the credit or water system. The scientists assumed that in a plenary meeting, powerful actors would dominate the analysis, so they opted for individual interviews with the workshop participants and the identified key actors. Additional scientific research was only done when necessary.

2) *An RPG followed by sub-group discussions and a plenary meeting (1 day),*
   Researchers assumed that the RPG enabled farmers 'to mobilise a rich picture about the socio-ecological system dynamics': (a) to compare the game dynamics with their real life experiences and to assess the validity of the scientists' representation; (b) to gain a better understanding of the situation, behaviour and reasoning of other stakeholders; (c) to take some distance from their real life situation and observe, experiment and reflect on the system dynamics (d) to exchange knowledge and reflections with actors from other farmer categories. After the RPG participants first discussed the issues with participants from similar farmer categories, to subsequently share their insights with others at the concluding plenary session. The RPG session allowed scientists to gain more insight in the relations, behaviour and reasoning of the participants.

3) *Individual interviews (the day after an RPG)*
   Through interviews scientists wanted to get more insight in the reasoning behind the decisions and the game behaviour of players and to identify differences between game behaviour and real investment behaviour. They also monitored the learning and change of opinion of the participants and assessed the utility of the play as perceived by the players. Scientists assumed that in individual interviews players felt freer to talk than in sub-group and plenary meetings. Inquiries also encourage participants to further reflect on the discussion, to mature their thoughts and opinion.

4) *Sub-group and plenary (participatory) simulations (two days after an RPG)*
   At the simulation sessions scientists wanted to get to a final opinion about an RPG, to show the link between the RPG and the computer simulation and to show the long-term system dynamics of options tried in the game. The final aim was to use the computer model to jointly explore the long-term dynamics of all kinds of creative options hopefully leading to inclusive negotiation. In the last cycle ComMod also tried a new method: participatory simulation in smaller homogeneous groups. It was assumed that this method would enhance the comprehension by the participants and make them more outspoken, notably the timid and the poor. In this way they could better identify the scenarios that served their interests.

The articles about the Mae Salaep experience (Barnaud *et al*, 2006, 2008; Barnaud et al, in prep.) demonstrate a clear interest of ComMod scientists in learning, empowerment and advocacy. They focussed on the differences in access to renewable resources of the various

farmer categories, the limiting effect this has on people's livelihoods and the possibility to use ComMod tools to create awareness on this issue and to stimulate the search and acceptance for more equitable solutions. ComMod scientists developed RPGs that highlighted the differences in resource access between farmer categories (Barnaud et al, in prep.). ComMod scientists knew the RPG sessions would not automatically lead to more equitable solutions. However, they hoped that the discussions in homogeneous sub-groups, the reflection provoked by the individual interviews, the computer simulations that confirmed the possibility of equitable solutions and the informal discussions with relatives and friends at home would enable the marginalized to become more aware of the possibilities and support them in their position in the discussion about what collective action to take. At the same time it was assumed that richer participants would enjoy the playful atmosphere of the RPG, that they would take notice of, and better understand the unfavourable situation of their co-villagers and become receptive to possible win-win options. In fact, scientists simultaneously aimed at empowerment of the marginalized and advocacy of equitable solutions.

4.2 The effect of ComMod activities as perceived by the participants

4.2.1 The effect of the ComMod activities

Substantive learning: learning about the issue

ComMod focuses on learning for collective action, so RPGs and simulations explored the effect of various collective credit and irrigation water arrangements on the farm production and income of the respective farmer categories. In interviews right after the ComMod interventions (July/August 2005), the participants talked a lot about the positive effect of new formal credit rules and a more equitable water distribution with multiple village water reservoirs. Respondents noted they had attained a better understanding of the complex dynamics of the local rural credit system (2nd cycle) and the irrigation water management systems (3rd cycle). Two years later, and with no progress in the implementation of the ideas, participants said that they still valued the ComMod intervention, as it enabled them to reflect on overall farm dynamics and the value of certain farm practices. Especially poor, illiterate farmers underlined the importance of individual learning. For instance, one farmer mentioned, that she learned she could not only borrow money from relatives to cover urgencies such as food shortage, but also to invest in agriculture. Another farmer got inspired and proposed his neighbours to join forces and build a collective water reservoir.

Social learning: learning about other peoples' situation and opinions

During the final impact study in 2007, people hardly mentioned their learning about other people's activities and problems, but these issues regularly emerge in the interviews of July/August 2005, right after the third ComMod cycle. At that time, participants claimed the most important thing they had learned from the game concerned the other stakeholders' situations, strategies and problems. This is quite surprising as these participants live in the same village. But as a village leader in Mae Salaep stated: "in everyday life everyone has his/her own problems" and lives according to his/her daily routine.

Alignment, engagement and mobilisation of the village constituency

The 3rd learning cycle evoked the liveliest debate. During the 2nd learning cycling it took a little while, but it was not hard for the richer and the poor to agree that 'the prolongation of the repayment period of formal credit would enable more (poorer) households to make long-term investments in perennial crops'. However, someone noted that various other villages had

already proposed this change to higher-level authorities, so further engagement and action was of no avail. At the 3rd learning cycle, participants had competing interests. It was hard to stimulate farmers to think beyond the traditional water rights favouring the prosperous first-arrived farmers, and consider options with more equitable access to water. At first, participants hardly dared to discuss this issue publicly, but after a lapse of time, some inquiring interviews and informal discussions participants became firm on the issue (Barnaud *et al.*, in prep.). The group of poorer farmers gathered around the Christian leader, gained cohesion and started to speak out. Before, they used to limit their discussions to close relatives and friend, but this time respondents said they discussed the issue at collective working parties, village meetings and after the church services. Even after two years, during the final evaluation interviews, respondents felt aroused and bad about not being able to mobilise and persuade fellow villagers and the TAO (*Tambon* sub-district Administrative Organization) representatives, responsible for the village infrastructure projects. They sighed that their discussions were unstructured and less convincing. They did not manage to create the cooperative state of mind 'like ComMod' and asked for communication support.

When talking about engagement and mobilisation of fellow villagers it is important to consider the hierarchist culture of the Thai society: people put much trust and respect in authority and expertise (Hood, 1998). Given this context, the lively village debate on the water issue surprised both researchers and participants.

Villagers discussed the issue for three weeks, but then the feeling of urgency and engagement faded. During the debates, the TAO representative tended to agree with the opinion of the majority, but when the discussion lost momentum he shifted back to his previous opinion/position.

Networking, mobilisation and negotiation with key actors (at higher decision-making levels) to create space for action.

ComMod efforts to include the TAO leaders in the village discussion did not work out positively. Despite the discourse of decentralisation, actual decision-making routines of officials were still top-down. At the workshop, the TAO president discouraged village deliberations. Interactions of local leaders with higher-level government officers were still limited and did not change much (e.g. the local elite did not approach the Royal Irrigation Department regarding the progress of the water project). Local leaders who have regular face-to-face contact with villagers seem somewhat more open for a deliberative routine. The ComMod deliberations enabled them to better inform villagers and jointly discuss the implementation policy issues. However, a Thai research partner remarked: "the present political situation is such that villagers are not powerful enough to convince policy makers, even local ones". It remains very difficult to commit authorities to local learning and negotiation processes with uncertain outcomes, as this means they might lose control.

Actual change in RRM practices

Various respondents stated that ComMod enabled them to learn about farm dynamics and motivated them to seek the technical information needed to realise their farming ideas. Some respondents applied new farm practices[3]. At the collective level, the discussions did not lead to any new action. The TAO representative formulated a water infrastructure project, but this was the third in its kind and the content is unknown and may not reflect the village opinion. Participants and development workers appreciated the ComMod games and

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[3] However, one needs to be cautious in attributing these changes to the ComMod intervention. The drivers of such changes are multiple and the ComMod process might just have complemented them.

discussions, but did not feel they could create similar learning and discussion events: "the methods are very labour intensive".

4.2.2. Appreciation of the methods and process design

Respondents easily identified the ComMod methods they liked most: They highly valued the RPGs coupled with the structured plenary discussions. The RPGs 'were fun', made people talkative and made people 'see the links and dynamics' and 'better understand 'other people's behaviour'. Participants also recognized the added value of the computer simulations, but were less outspoken about it. Despite the low level of education, most participants were able to explain the messages/trends portrayed by the computer simulations. The visualizations of long-term effects attracted attention. Participants did not get bored but followed the simulations that further elaborated on issues proposed by them. It confirmed their ideas and gave them confidence and inspiration. However, the MAS sessions triggered less discussion than the RPG sessions. The facilitator noticed: "this time people just sat down like students". This hints at a potential danger of computer simulations: people respect and trust scientific knowledge. After the joint validation of the conceptual model, farmers put much trust and confidence in the simulation outcomes. "They perceive it as real". They do not seem to realize that simulation outcomes easily change with new developments in market prices, political situation, rainfall etc. Several respondents noted the simulation gave them confidence to start a certain action, while they should have remained critical.

Respondents found it difficult to identify 'activities that lacked'. While telling their story, some remarked they lacked the capacity to convey their learning experience or to create a cooperative atmosphere, when talking to co-villagers. Others highlighted the need to involve higher-level decision-makers in the ComMod processes, but they had not idea 'how'.

5. Reflection on the ComMod intervention

This section presents a critical reflexive assessment of the participatory action research, undertaken by the ComMod team in Mea Salaep. Discussions between the evaluators and the ComMod scientists focussed on the effectiveness of the methods, process design and underlying action theory of the intervention, and the added value of the ComMod research approach for the present Thai decentralisation process: the societal fit and ideological ambitions of the ComMod researchers.

5.1 The effectiveness of process design

In Mae Salaep, the ComMod team wanted to introduce new 'participatory learning and decision-making heuristics' rather than 'short-term problem solving'. The RPG and simulations highlighted the difference in access to resources of various farmer categories, and envisaged to incite village communities to discuss these matters amongst them and search for more equitable solutions. The first evaluation question is whether and how they managed to attain this goal.

According to the ComMod posture, the ComMod approach is able to produce improved knowledge, more effective dialogue and negotiation in support of closing the gap between diverging points of view. ComMod methods create an inviting atmosphere for learning (facilitation tasks 2a and b of section 3.2). The ComMod team in Mae Salaep hoped the learning triggered by the ComMod would engage and motivate the 12 participants to induce discussion and change at the community level. Interviews with the participants showed that the ComMod approach, especially the RPGs and the plenary discussions, actually improved substantive and social learning. However at the 2nd cycle participants realized that they did not have the power to influence the key decision makers, and at the 3rd

cycle that they were neither able to internally agree on a collective solution nor to mobilise and convince fellow villagers and/or higher level decision makers.

The ComMod team did not feel they, as foreign researchers, had the legitimacy to get involved in negotiation and enforce agreement (facilitation task 2c). The people themselves had to be the driving force. In the last cycle ComMod scientists studied the effect of the ComMod tools on negotiation. The study showed ComMod methods not only raised the awareness of the poor and stimulated them to take a firmer position, but also created a cooperative spirit and receptive attitude amongst the richer participants. Due to the reluctance of the TAO representative, the coalition of the Christian leader and poorer farmers started to communicate in wider circles to convince non-participants, but they did not manage to create enough critical mass to induce change. They noted they lacked the communicative skills to transfer their knowledge and insight to fellow villagers.

Apart from learning in a small group (12 participants), collective change requires multilevel learning and negotiation (facilitation task 3): 'convincing and mobilizing one's constituency', creating momentum, enforcing final negotiation and agreement at village level', as well as 'networking, getting understanding and support of higher-level decision-makers'. Local actors are able to create change, but these kinds of change are usually led by the elite and not always favourable to the disadvantaged (Wollenberg, 2001). Collective change for the benefit of the poor often requires intensive discussion and persuasion over longer periods, and participants need support to make this happen. This can take the form of empowerment of the disadvantaged and/or continuous facilitation of multilevel learning and negotiation. At times, real bottlenecks are located at higher levels and scientists can help by creating linkages among the parties concerned, identifying new policy options (Giller et al, in press).

The 3-day workshops and individual interviews did not provide the necessary support to attain change at the collective level. ComMod scientists realized this and developed a new tool: hybrid simulations. These are computer games in which real participants play with fictional players. These so-called participatory simulations make it possible for small homogeneous groups to explore their situation, interests and favourable options in a safe environment. It enables them to articulate their interests and prepare themselves for plenary discussions. In later projects, ComMod also used these hybrid simulations at community meetings. Some farmers play the projected computer game in front of a larger audience, who discuss and explore long-term options. Apart from these improvements researchers could increase the impact by including more enthusiastic, communicative people and informal role models in their RPG. Furthermore, they also need to prepare for conflicts and multi-level negotiation. Change tends to affect interests, and those with vested interests will try to maintain the current 'regime' (Geels, 2002). At the higher political level, decision-makers tend to adopt 'insights' when they fit with their longer-term argumentation and personal career perspectives (Nooteboom & Teisman, 2003). At present, decentralisation is promoted at the higher political level, but various government officers find it hard to apply. To create societal impact, the ComMod scientists need to extend the action-theory beyond 'the enhancement of inclusive learning' and further elaborate on negotiation, empowerment and advocacy (Task 2c in combination with task 3). Critics would argue that scientists hereby pass the boundary of science. This may well be and everybody has to consider his own position. Researchers are supposed to produce knowledge and often lack the resources (time, skills, methods), legitimacy and power-base to work on empowerment and multi-level advocacy. Action research scientists, therefore, need to carefully consider the role they want **and** can play. It may be advisable to link up with local facilitators employed by government, NGO's etc. They have the interests, skills and resources for prolonged facilitation, and possibly also a local power-base to support negotiation, agreement and action.

5.2. The added value of the ComMod research approach for Thai society

Participatory action research presupposes an equal status between scientists and societal stakeholders. In learning theories, such as embraced by the ComMod scientists, all actors are 'inquirers', engaged in a process of social learning through social debate (Hoppe, 2005). However it is questionable if policymakers share this perspective on science-citizen-policymaker collaboration. The participation of policymakers depends on their normative views on democracy and public management as well as on policymaker-scientist collaboration.

With the reform of the TAO in 1994 and the adoption in 1997 of the so-called 'People's Constitution' (Arghiros, 2001; Rutherford, 2002), Thailand formally adopted participatory democratic principles, in particular in relation to natural resource management (Puntasen, 1997). But formal adoption of the decentralisation discourse, does not automatically lead to a cultural change in attitude. In Thailand, public organisation is dominated by a hierarchist culture in which citizens value indirect representative democracy and assume the altruistic ruling of the political and scientific elite (Hood, 1998). In such a perspective, participatory learning and negotiation processes may be seen as a support and enrichment of political arguments, but more often are seen as a possible concentration of power in the hands of those who oppose, or shout loudest (Mayer et al, 2005). In Thailand, some ministerial departments embraced participatory approaches but most departments perceived interactive policy processes as a threat rather than an opportunity for better-informed decision-making. In Mae Salaep, despite her decentralisation rhetoric at the office, the TAO president did not want to get involved in any water negotiations.

Various Thai policymakers still struggle with interactive policy processes but they highly value scientific expertise offered by projects like ComMod. Policymakers work in complex bureaucracies characterised by strong hierarchical social relations and interaction patterns. In Thailand, people consider themselves Buddhist and strife for social harmony: they value mutual aid and cooperation while evading overt social confrontation (Patamadit & Bousquet, unpublished). In hierarchist cultures, leaders tend to approach issues from a 'public good', 'helicopter' or systems perspective and consider problem solving as an intellectual effort, best left to experts (Hoppe, 2002: 312-313). Policymakers adhere to the technocratic model (Hoppe 2002; 2005), they have no time to get involved in time consuming learning and research processes, but employ experts and expect scientific institutions to improve the knowledge base, providing more effective and efficient policy solutions.

The policymakers did value the scientific research but found it hard to get involved in interactive learning processes as these processes more or less contest their societal decision-making routines. The question is how to align the bottom-up approach with the prevailing institutional arrangements? Several alignment strategies are possible: (a) to concentrate on issues that the villagers are authorised to decide upon at community level, (b) to act as a broker, informing policymakers about the research results; (c) to look for individual policymakers willing to try participatory approaches, and help him/her to justify his participation vis-à-vis superiors; (d) to work on empowerment of the local stakeholders. The first option is the easiest one, but it seriously limits the space for change to the local stakeholders. The second option fits best with the actual Thai government decision-making routines. As local stakeholders are not yet in the position to convince political leaders, communication is most effective when scientists formally and informally engage in the multilevel, decision-making process. In this way, scientists are able to closely monitor the dynamics of the administrative and political discussions and know when it is opportune to provide their scientific input (Nooteboom & Teisman, 2003). The visualisation of scenarios helps scientists to give persuasive performances with clear story-lines that stick in leaders

memories (Hajer, 1995; Hoppe, 2005). In this way, scientists enrich the political debate and stimulate good decision-making. For action researchers who aim at problem solving this may be *the* option. However, ComMod aimed to install 'new learning and decision-making heuristics'. In this case mediation by scientists is needed to provide concrete results stimulating people to continue, but it may also dampen the local empowerment dynamics. Scientists together with local actors need to discuss the strategy best fit for the specific context. Close monitoring of the evolving empowerment and multi-level negotiation process will guide the design of future action.

The Thai ComMod team adhered to the ideology of 'participatory democracy'. They did not act as brokers but used computer simulations to prepare authorities for their participatory direct involvement in ComMod workshops. This did not work well so far, but high-level officials encouraged ComMod scientists to continue 'to create examples for the future'. Meanwhile, the evaluation showed that local actors do value the ComMod approach: they recognise the potential of the introduced 'learning and decision-making heuristics', though it did not yet lead to collective change. ComMod made participants aware of the situation, facilitated coalition building and encouraged advocacy vis-à-vis fellow villagers and higher officials. This way, ComMod introduced new learning and decision-making routines. Thai society is presently in a flux of change and small, incremental change can make a difference. Local actors appreciate the sharing of experiences and joint reflection. Authorities avoid involvement in participatory processes, but may accept win-win solutions advocated by the ComMod scientists. And last but not least, ComMod scientists train agricultural researchers who educate future planning professionals at the universities. Being modest and applying a multi-pronged empowerment and advocacy strategy seems the best approach within the Thai context.

6. Conclusion

Recent insights about uncertainty, complexity and high stakes involved in Renewable Resource Management, call for decentralised contextual decision-making. Agricultural scientists are encouraged to engage in participatory action research for adaptive management. But those who engage in participatory action have different aims: Some aim to enrich local knowledge production to support local problem solving, while others prioritise the development of new 'learning and decision-making heuristics'. In this study the impact of an example of this new way of science was assessed. The results showed that ComMod activities successfully mobilised learning at the local level, but this did not lead to any collective action. To attain action, action researchers need to bypass their focus on knowledge-production and further develop action theories including facilitation tasks such as the empowerment, management of conflict, and multilevel negotiation. In practice, researchers do their best to deal with these issues but they often lack the knowledge, skills and resources to guide local actors to agreement and action. A more comprehensive action theory and more intense collaboration with local development officers seems needed. However, it is important to recognise that problem solving is not the ultimate aim of these interventions. In the end adaptive management routines, routines of context-embedded participatory learning and negotiation have to emerge. When looking from this perspective, ComMod actually served as an appetiser for the future. Local stakeholders were not discouraged by the lack of results but underscored their learning and felt inspired by the approach. Participatory action research does not yet align with the present government culture and routine. But with a proper action theory and multi-pronged empowerment and advocacy approach, participatory action research may bear fruit.

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