The application of Rapid Appraisal of Agricultural Innovation Systems (RAAIS) to agricultural adaptation to climate change in Kazakhstan: a critical evaluation

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Abstract

Place-based social, cultural, institutional and political dynamics not only influence the innovation capacity of agricultural systems, but also the willingness of relevant actors to be involved in participatory research processes, and the dynamics of their participation. This paper critically discusses the modification and application of one particular participatory approach to agricultural systems analysis (Rapid Appraisal of Agricultural Innovation Systems [RAAIS]) to agricultural adaptation in Southeast Kazakhstan. We consider the overall effectiveness of the method as a research tool, practical issues in the implementation of workshops, definition of and selection of participant groups, as well as the questions of participation and empowerment within the workshops themselves. We find that although RAAIS is adaptable to alternative theoretical frameworks, its implementation in different socio-cultural and political contexts may require more consideration than is apparent in previous discussions. In particular, the appropriate training of workshop organisers is of crucial importance to the success of this methodology. These findings will be useful to those adapting participatory research methods to different research topics and contexts more broadly.

Keywords

Rapid Appraisal of Agricultural Innovation Systems, participatory research, adaptation to climate change, agriculture, Kazakhstan

1. Introduction

Rapid participatory appraisal techniques have a long history (Chambers, 1994a; Cornwall and Pratt, 2011), and many interdisciplinary and participatory approaches have been proposed to examine and address complex problems in agricultural systems, such as vulnerability to environmental change, innovation, or sustainability (World Bank, 2012). While such approaches have been successfully applied in particular socio-cultural and political contexts and to specific problems, their fit, flexibility and applicability to other contexts and problems usually remain unquestioned (Campbell, 2002).

This paper contributes to the literature on interdisciplinary, participatory approaches in agricultural systems analysis by critically discussing the modification and application of one particular approach – Rapid Appraisal of Agricultural Innovation Systems – to agricultural adaptation in Southeast Kazakhstan.

The paper first provides background information on the Rapid Appraisal of Agricultural Innovation Systems approach and on the agricultural adaptation project to which we applied it. After briefly presenting how we evaluated our application of the Rapid Appraisal of Agricultural Innovation Systems approach, the paper describes the modifications made by the authors of this paper to the original approach and its implementation in Kazakhstan. We finally critically reflect on this implementation to derive lessons for the future use of the Rapid Appraisal of Agricultural Innovation Systems approach and other similar approaches for agricultural system analysis.

2. The Rapid Appraisal of Agricultural Innovation Systems

The Rapid Appraisal of Agricultural Innovation Systems (RAAIS) "is a diagnostic tool that can guide the analysis of complex agricultural problems and innovation capacity of the agricultural system in which the complex agricultural problem is embedded" (Schut et al., 2015a:1, see also Schut et al., 2015b, 2015c, 2015d). RAAIS emerged from agricultural innovation studies (e.g. Klerkx et al., 2010; Klerkx et al., 2012) and the Farming Systems Research approach (Darnhofer et al., 2012). As such, it is a multidimensional (e.g. biophysical, technological, socio-cultural, economic, institutional and political), multilevel (e.g. national, regional, local), multi-stakeholder (e.g. farmers, government, researchers, civic society) and participatory approach to assess the innovation capacity of an agricultural system (Schut et al., 2015a). RAAIS has two main foci. Firstly, it supports the analysis of existing constraints such as those related to the institutional, sectoral and technological subsystems of the agricultural system. Secondly, RAAIS helps to identify entry points for innovation, which can be either specific, i.e. directly related to the problem under study, or generic, i.e. related to the broader innovation capacity of the agricultural system and the performance of the agricultural innovation support system (Schut et al., 2015a).

Methodologically, RAAIS "combines multiple qualitative and quantitative methods, and insider (stakeholders) and outsider (researchers) analyses which allow for critical triangulation and validation of the gathered data" (Schut et al., 2015a:1). Specifically, Schut et al. (2015a, 2015d) and Schut (2014), suggest combining the following complementary data collection methods: (i) multi-stakeholder participatory workshops, aimed at gathering insider analyses of innovation capacity in the agricultural system and the structural conditions provided by the agricultural innovation support system (Table 1), (ii) semi-structured in-depth interviews and (iii) surveys – both aimed at in-depth investigation of any important issue among any of the stakeholder groups –, as well as (iv) secondary data collection aimed at contextualising, complementing and triangulating data gathered using the other three methods.

RAAIS was applied and tested in studies of crop protection and sustainable intensification in several African countries (Schut et al, 2015b, Schut et al., 2015c, Schut et al., 2016). Its application permitted researchers and agricultural system actors to identify entry points for innovation, and showed that multi-stakeholder involvement in the analysis of constraints and the development of action plans for innovation can function as important elements for continued stakeholder collaboration in multi-stakeholder platforms (Schut et al., 2015a).

3. Project background: Climate Change, Water Resources and Food Security in Kazakhstan

We employed RAAIS in the project *Climate Change, Water Resources and Food Security in Kazakhstan* (CCKAZ) to investigate main challenges and ways forward in water use in agriculture. CCKAZ aimed to examine and predict impacts of climate change on water resources and crop production in Kazakhstan. CCKAZ approached the study of climate change impacts on water resources and crop production interdisciplinarily, through a combination of regional climate, hydrological and crop models, and a working package that addressed the human dimension of agricultural adaptation to climate change. It is within this working package that RAAIS was employed. More specifically, with focus on the two villages of Karaoi and Koram in the south-eastern Almaty region, this working package aimed to: (i) characterise the water systems in their multiple dimensions (i.e. technical, economic, social, cultural, political); (ii) identify the challenges faced by a range of actors directly or indirectly involved and affected by water use in agriculture; (iii) identify current water use and water management practices employed to deal with water stress and variability; (iv) identify entry points for adaptation of water use in agriculture. The fieldwork was conducted in three phases between September 2015 and March 2016.

This study was informed by a Farming Systems Approach (Darnhofer et al., 2012) and by current

advances in the understanding of adaptation to climate change (e.g. Smit and Wandel, 2006; Nelson et al., 2007; Moser and Ekstrom, 2010; Fazey et al., 2016), and with specific reference to agricultural adaptation (e.g. Smit and Skinner, 2002; Rickards and Howden, 2012; Feola et al., 2015). Among the most relevant contributions of this scholarship are (i) the systematic classification of agricultural adaptations as they relate to different scales and levels, decision-makers, and adaptation processes, and (ii) an increasing understanding of how agricultural adaptation occurs in different farming systems; that is to say the determinants of adaptive capacity and the processes by which those determinants may result in a resilient system. As explained in the following section, this literature was fundamental not only in designing the study overall, from hypothesis formulation to interpretation of findings, but also specifically in adapting RAAIS to this study.

4. Methodological note

RAAIS had been applied before to a range of agricultural problems, but never to water management. We follow Schut et al. (2015a) in suggesting that the application of RAAIS to different agricultural problems may contribute to the improvement of this methodological approach. Furthermore, RAAIS had been applied in Africa (Ghana, Benin, Nigeria, Uganda, Rwanda, Tanzania), East Asia (China, Laos, Cambodia), and Central America (Nicaragua), but never in Central Asia.

Based on our experience and two preparatory field visits in September and December 2015, we hypothesised that our application of RAAIS may be influenced by a range of situated socio-cultural and political features that made our context different from the ones in which the approach had previously been applied. These included social hierarchies, social and power relations, notions of authority, strength and density of social networks, culture of institutional decision-making (e.g. bottom-up or top-down)

inter-ethnic and gender relations (Barrett et al., unpublished). We were specifically concerned with three potential issues. Firstly, we expected that social, cultural, institutional and political dynamics would influence the willingness of relevant actors to be involved in the participatory processes, and, secondly, that these dynamics would also influence the forms of engagement in the process. Thirdly, we hypothesised that contextual differences may challenge some of the implicit assumptions of RAAIS, particularly regarding the type of actors present, and relevant, in any given farming or innovation system, including the assumed role of the civil society or of scientists, and the definitions of fundamental terms such as 'large- or smallholding', or what constitutes 'farming' as a socially recognised activity. Our hypotheses were supported by literature that has engaged with critical examinations of participatory approaches in agriculture. This literature has shown that not questioning issues of fit, flexibility and applicability of participatory approaches to different contexts and problems may result in undermining the validity of participatory research, its potential to generate information on local social relationships, and to give voice to marginalised groups (Mosse, 1995; Campbell, 2002; Gaventa and Cornwall, 2005; Preece, 2006; Cornwall and Pratt, 2011). As argued by Bourke (2006) it is important for participatory researchers to be adaptable and open to differing levels of participation and methods, as participants may engage differently in the participatory process in different places. Adaptability and openness are enabled by a self-critical and conscious engagement with participatory processes by all participants, including the more powerful ones, and the researchers themselves, which can be supported by creating spaces for critical reflection and process documentation (Mosse 1995; Gaventa and Cornwall, 2006; Cornwall and Pratt, 2011).

In this spirit, our self-critical reflection of the application of RAAIS in Southeast Kazakhstan was based on feedback collected during semi-structured interviews (see next section), and three research team debriefs that were held after each multi-stakeholder workshop and at the end of data collection, respectively (Appendix 1).

5. The application of RAAIS to agricultural adaptation to climate change in Kazakhstan

From the many methods that have been proposed to assess farming systems innovation (see World Bank, 2012), we chose to employ RAAIS in this study for a number of reasons. Firstly, RAAIS is rooted in the same holistic Farming Systems approach that informed our study, and that conceptualises farming systems as complex social-ecological systems. Furthermore, similar to the conceptualisation of innovation in Schut et al. (2015a) and consistent with the scholarship on adaptation to climate change, we conceptualised agricultural adaptation as a complex or wicked problem, i.e., one that is insoluble, has multiple dimensions, entails interactions across different levels, and involves a multiplicity of actors and stakeholders with contradictory interests and certitudes (Frame, 2008). RAAIS permits investigation of such complex problems across dimensions, levels and actor groups, and therefore it offered a suitable methodological approach for the study of water use adaptation in Kazakhstan. Secondly, RAAIS allows for a diagnostic of both constraints, and entry points for innovation (conceived of as 'adaptation' in our case). In other words, RAAIS enabled us to focus on our study's two objectives: to examine barriers to change (adaptation), and to identify ways to enable change in the system, i.e. to do things differently and to do different things (first and second order change). Such a perspective on change dynamics, rather than on static assessments or targets, is essential in understanding adaptation processes (e.g. Feola et al., 2015). Thirdly, RAAIS is a relatively rapid assessment tool (Appendix 1), which matched the capacity of our research team given the timeframe and the resources available to our project. Thus, RAAIS was preferred over other approaches that have been found to be less able to integrate multiple dimensions or levels, that are conducted ex-post rather than ex-ante, and that require more time to implement (e.g. Schut et al., 2015a).

As an interdisciplinary research team, we implemented RAAIS following Schut (2014) and Schut et al. (2015a). However, in both the design and conduct of the study we made a number of modifications to

RAAIS. These modifications were motivated either by practical contextual constraints or by conceptual differences between the objectives, theoretical framework and complex problem investigated in our study and those of earlier applications of RAAIS. This section describes the most significant modifications that we made to RAAIS and their rationale, while subsequent sections critically discuss these changes and the application of RAAIS to agricultural adaptation to climate change, particularly water management, in Kazakhstan.

5.1 Multi-stakeholder workshops

We conducted two one-day multi-stakeholder workshops in the villages of Koram and Karaoi on February 24th and 26th 2016, respectively. We followed Schut (2014) in designing the first workshop phase, which aims to identify constraints and challenges around the workshop entry theme (Table 1). In both study sites, the entry theme was *Water-use in agriculture: main challenges and ways forward.*

Table 1. **Phases and exercises in RAAIS and in its application to climate change adaptation in Kazakhstan. See text for description of modifications, and Appendixes for details of the Exercises.**

Phase	Exercise #	RAAIS by Schut et al.	New Exercise #	RAAIS in CCKAZ
Identifying constraints		Introduction		Introduction
	1	Individual brainstorm	1	Individual brainstorm
	2	Ranking constraints to innovation	2	Ranking constraints to adaptation
Categorising constraints	3	Identifying type of constraint to innovation	3	Identifying type of constraint to adaptation
	4	Categorising type of constraint to innovation	4	Categorising type of constraint to adaptation
	5	Categorising constraints and challenges across levels	5	Categorising constraints and challenges across levels
	6	Identifying linkages between constraints and identifying key constraints	6	Identifying linkages between constraints and identifying key constraints
	7	Categorising constraints and challenges along Humidtropics Intermediate Development Objectives (IDOs)		-
	8	Subdividing between Entry Theme specific and more generic constraints		-
Exploring entry points for innovation	9	Different types of research that can support addressing the constraints and challenges		-
	10	Prioritise constraints and challenges under different research categories		-
	11	From constraints and challenges to entry points and best bets for innovation	7	From constraints and challenges to entry points and best bets for adaptation

Focus on adaptation. The most significant conceptual modification entailed changing the focus of the workshop from agricultural innovation to agricultural adaptation to climate change. This required modifying two exercises in the second workshop phase, which aims to categorise constraints. While both adaptation and innovation entail processes of change at multiple levels, and while adaptation often entails

social, institutional and technical innovation (Chhetri et al., 2012; Rodima-Taylor et al., 2012), we considered it appropriate to design exercises that employed specific adaptation-related theoretical frameworks rather than generic innovation ones (Table 1).

In Exercise 3, Schut (2014) proposed to categorise constraints according to dimensions of complex agricultural problems (e.g. technological, institutional, socio-cultural). We instead used specific categories drawn from Smit and Skinner's adaptation framework (2002) (Figure 1). This framework defines different types of agricultural adaptation measures, and was therefore used in this context to identify the types of constraint faced by different actors; the participants were asked to reflect on the nature of the identified constraints and challenges, i.e. whether those constraints were problems of (i) technological development, (ii) government programmes and insurance, (iii) farm production practices, or (iv) farm financial management (Figure 1, and Appendices 1 and 2).

Constraint/ challenge	Technological development	Government programme	Farm production	Farm financial management	Other
[Card 1]					
[Card 2]					
[Card 3]					
[Card 4]					
[Card 5]					

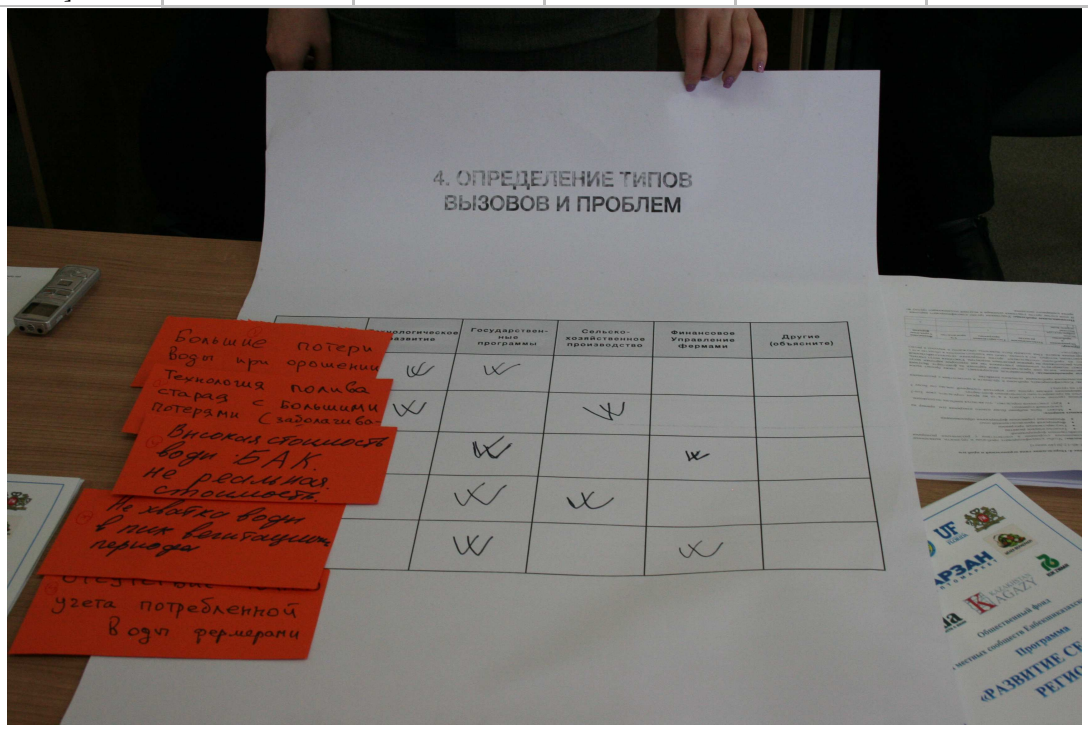

Figure 1. Categorisation of constraints/challenges, indicative table and poster in use.

While Exercise 3 required participants to discuss and identify *what type* of constraints they were facing, Exercise 4 required them to discuss and categorise *why* those constraints were problematic for water use adaptation, i.e., at what stage of the adaptation process those constraints may act as barriers to change (adaptation). In Exercise 4, Schut (2014) proposed to use four categories of innovation systems failures. Instead, we used categories of barriers to adaptation derived from the model of the adaptation cycle (Figure 2) developed by Moser and Ekstrom (2010). This theoretical framework conceptualises a generic

process of deliberate adaptation of the type expected in agricultural water use. While decision makers may not explicitly go through these steps, they are analytically useful categories for relating constraints to the process of change involved in climate change adaptation. Thus, in this exercise participants were requested to consider whether the five constraints and challenges collectively selected and ranked in Exercise 2 represented problems of (i) understanding (i.e., participants do not know enough about what is going on in the water system to be able to change/adapt), (ii) planning (participants know what is going on but have difficulty deciding and planning what to do to change and improve water use, or (iii) managing (i.e. participants know what is going on, and know what they want to do, but they do not know how to implement these water-use changes and adaptations) (Figure 2, and Appendix 1, 2).

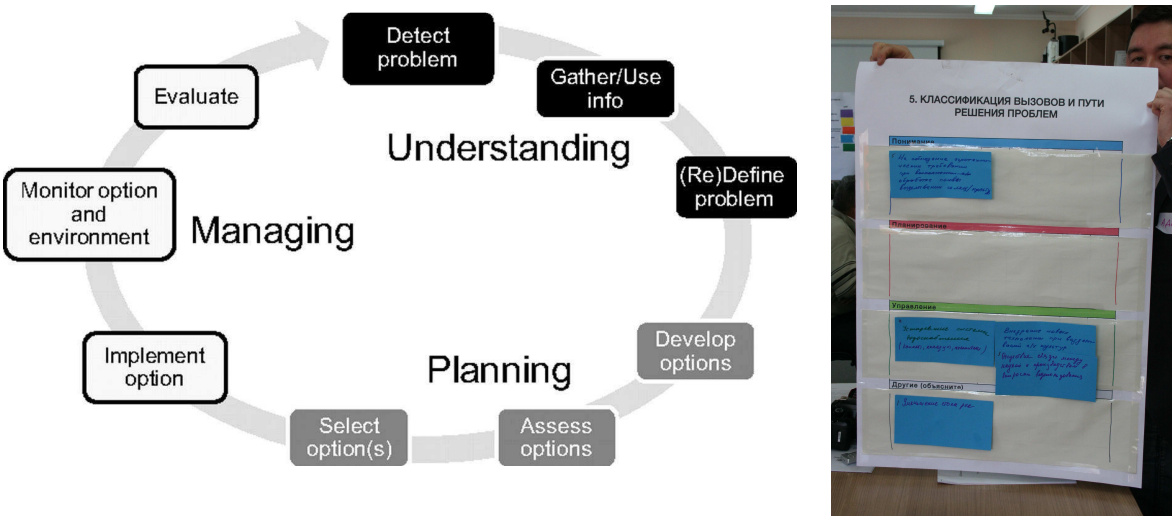

Figure 2. Phases and subprocesses throughout the adaptation process (Moser & Ekstrom 2010, p. 22027)

In both Exercises 3 and 4, in order to test the frameworks used to categorise constraints, we added the option *Other* to allow for participants to express the possibility that the categories provided would not suitably represent their perceptions, and thus to avoid forcing participants to fit our predetermined conceptual models (Appendix 1, 2).

Workshop duration and objectives. The most significant structural change from the original application of RAAIS by Schut et al. involved shortening the workshop from one and a half days to one day (i.e. approximately 8 hours). In prior consultation with our non-academic local partners, we considered that extending the workshop over two days would have very likely made it impossible for various stakeholders to take part in the workshop due to other working commitments. We shortened the workshop mostly by dropping exercises in the workshop's third phase on *Exploring entry points for innovation* (Table 1). We condensed the discussion of possible adaptations to one exercise, as only one of the four objectives of the study concerned the identification of entry points for adaptation of water use in agriculture, and this objective thus had less weight than system characterisation and examination of constraints and current adaptive practices. Our study was limited to a diagnostic phase and only partly explored the pathways for supporting specific innovations in practice.

Group composition. We changed the recommended group composition in order to match stakeholder presence in each study site and, most importantly, to reflect differences we had hypothesised to be important regarding the entry theme. Thus, in the site of Karaoi we could not identify any scientists with sufficient expertise of the area who would be able to participate in the workshop, while in Koram we placed NGO and agribusiness representatives in the same group, as NGO and agribusiness were represented by fewer than five participants each. These reflected context-specific institutional differences, such as the collapse of state agricultural extension services following independence and the relative weakness of the NGO sector in agriculture. Most importantly, in both workshops we separated farmers with small- and medium-/large- landholdings. Discussions with non-academic partners in preparatory visits preceding the workshop had highlighted the local prevalence of smallholders and tenant farmers and their lack of involvement in state programmes. We expected that the constraints experienced by these

groups, and the entry points for innovation, would potentially be substantially different. Not distinguishing between farmers with small and larger landholdings would have masked such differences and therefore resulted in poor understanding of the farming system.

Short presentations. We introduced short plenary presentations (approximately 5 minutes per group) after Exercises 2, 3, and 4. These presentations aimed to (i) increase the number and depth of opportunities for cross-stakeholder group interaction, (ii) prepare the ground for the final plenary discussion in Exercise 6 and the mixed group discussion in Exercise 7, (iii) enhance the sense of ownership among participants, (iv) provide more space for articulation of the rationale behind the posters produced within each group, which was essential data to be analysed after the workshop. Exercise 7 was also followed by short presentations to permit a final sharing of the discussions that had occurred within each mixed group.

Other modifications. We made a series of minor, but targeted modifications. First, with the aim of facilitating informal social interaction within and across stakeholder groups during the workshop, while managing breaks efficiently, we made refreshments available in the workshop room throughout the workshop rather than at specific coffee break times. Similarly, we served lunch in the workshop room, which limited the dispersion of participants and allowed for efficient time management. We also postponed the lunch break until after Exercise 5. During the first part of the lunch break, the researcher team could thus reorganise the cards on the central board and rewrite those written in small or unclear handwriting (Appendix 1 and 2), which facilitated a smooth continuation and effective participation in Exercise 6 after the lunch break. Finally, we did not have note-takers and mostly relied on electronic recordings of the discussions and the cards and posters for data analysis.

5.2 Semi-structured in-depth interviews, survey, secondary data collection

Schut et al. (2015a) suggest combining multi-stakeholder workshops with interviews, surveys and secondary data analysis.

Semi-structured in-depth interviews. We conducted 21 interviews with interviewees sampled from the workshop participants following an opportunity sample design, whereby farmers were purposively over-represented (10 out of 21 interviewees) to gain better insight of the experiences and perspectives of water users, and of this social group that is otherwise often overlooked in local policy-making and research. As suggested by Schut et al. (2015a) we carried out the interviews after the workshops, and used the insight from a preliminary workshop data analysis to finalise the design of the interview protocol (i.e. list of topics and broad questions). However, we put emphasis on (i) understanding the water system and (ii) current adaptation practices from the interviewee's perspective, rather than on further discussion of constraints and challenges, which we estimated to have been sufficiently covered in the workshops. Also following Schut et al. (2015a) we recorded the interviews for subsequent analysis, and aimed at a duration of approximately one hour per interview.

Survey. Due to limited resources available in the project we did not conduct a survey.

Secondary data collection. We collected secondary data available from the National Agricultural Census of 2006/2007, local authorities, including annual reports of municipal and district administrations and statistical databases, and agricultural statistics from the Kazakh Ministry of National Economy. These data mostly consist of standard agricultural indicators aggregated at the agricultural region or regional district level, and are therefore only relevant for this study as a broader contextualisation of the data collected through the multi-stakeholder workshops and semi-structured interviews.

6. Discussion

This section critically assesses the application of RAAIS to address agricultural adaptation to climate change in Kazakhstan, i.e., relating to a complex problem and socio-cultural and political context different from those where RAAIS was previously applied. Here we consider the overall effectiveness of the method as a research tool, practical issues in the implementation of the workshops, and issues of participation and empowerment before and during the workshops.

6.1 Effectiveness and organisation

Schut et al. (2015a) showed that integration of perspectives of stakeholder groups from different levels provides multi-layered insight into the nature of complex problems and the viability of potential solutions, fosters awareness of the fundamental interdependencies of stakeholder groups, and generates support for specific solutions that stakeholders have participated in elaborating. Our application of RAAIS has confirmed these methodological strengths, but it has also raised other issues. The perspectives elicited in the workshops presented a rather static and present-day oriented picture of the complex agricultural problem of adaptation to climate change (specifically water use adaptation). While they provided insight into the institutional context and levels of the problem, they were not effective in exploring dynamic aspects of the problem over time, such as responses to climate variability or extreme weather events in previous years. Additionally, the process whereby identified constraints and challenges were ranked into a top-five (Exercise 2) meant that subsequent discussions did not reflect the true weight of the issues as measured in the number of instances a constraint was mentioned in a card (Exercise 1). This blind spot only became apparent in subsequent coding and analysis of all cards, and is to be related to the tendency of several exercises in RAAIS, and of participatory processes more in general, to aim for consensus, thus masking difference within communities or systems (Gaventa and Cornwall, 2006). To overcome the blind

spot, we analysed both the ranking (Exercise 2) and the total number of appearances (Exercise 1) of each named constraint.

The combination of different methods of data collection was essential. Preliminary field visits were necessary to select sites and identify stakeholders. The workshops provided a good foundation for subsequent in-depth interviews. By this point participants were already familiar with the researchers and research aims and after preliminary data processing, researchers had acquired sufficient understanding of the farming system to gather richer information from the interviews. In-depth interviews provided a more dynamic image of how, for example, collaborations between stakeholders had evolved over the years, or how extreme weather events were managed. Thus, the in-depth interviews were an essential component of this research method. In our research sites, there was little secondary data available on the farming system and available statistics were of dubious reliability. Considering this lack of secondary data, a survey after the workshops and interviews would have been advantageous. In terms of the sequence of data collection, we recommend to first conduct and analyse RAAIS multi-stakeholder workshops to identify constraints (and entry-points), and subsequently conduct in-depth interviews and surveys that can provide more insight into the distribution and underlying causes of these constraints.

Effective facilitation was crucial to the success of the RAAIS workshops, but is not discussed by Schut and his colleagues. Various scholars have argued for the importance of facilitation of workshops in systemic enquiry (e.g. Chambers, 1994b; Mosse, 1994). The training of local facilitators is particularly important where they may not be sensitised to critical social science research practices or may be unreflective about local hierarchies and categories. Training included communicating that our aim was to facilitate a series of dialogues, not just run through the exercises, and detailing the conceptual premises and intentions behind each exercise. We found a training-of-trainers approach helpful, in which trained facilitators were asked to explain the workshop to other facilitators under the researchers' guidance.

One final observation in implementing RAAIS (in our adapted form); it was found that the workshops ended rather abruptly. A concluding exercise would be beneficial, such as formulating an action plan together or discussing what had been learned collectively. A simple supplementary exercise might ask "what have we learned from these six hours together?" and have each person write a take-home point on a card and discuss it. As an accommodation to local expectations, we found that a ceremony to present certificates of participation was welcomed (and indeed certificates were requested by academic participants).

6.2 Participation and empowerment

Issues of participation and empowerment must be considered at all stages in participatory research. Here we consider the definition and selection of participants as well as the dynamics of participation within the workshops themselves.

Participant selection and concept definitions. Selection of a specific entry point to the research site may entail a reliance on pre-existing networks in order to recruit participants (Adamo, 2001). At one research site farmers were drawn from the network of a local agribusiness NGO. This provided researchers with a locally trusted partner, but limited participation among farmers to those who were already involved in the activities of the NGO. Local municipal officials provided access to our second research site, with different implications for the definition and selection of farmer groups.

Preliminary field research indicated the importance of informal tenant and small-scale farming in Almaty region. In local official understandings, however, small-scale farming practitioners did not count as 'farmers', and these could easily have been left out of the workshops if their presence had not been specifically requested by the researchers. In preparatory fieldwork, we were told not to bother talking to

tenant farmers who grew crops for sale in the local wholesale market "because these people know nothing about the land, they're just in it for the money". This reflects local understandings of the farm as a large-scale institutional and systemic complex, such as the Soviet *kolkhoz*, and exposes the situated and culturally determined nature of key notions in RAAIS, such as 'farming'. On the other hand, there is an emerging class of farmers with larger landholdings and access to capital (Kerven et al., 2016), which could be easily more represented within the networks of local officials.

In order to capture possible differences between these groups of farmers, we selected separately for small-farmers and medium-/large-farmers. It was a good decision to not assume homogeneity of farmer interests: the two groups showed different trends, and small farmers were able to represent themselves in a way they might otherwise not have. Thus, this decision proved empowering in itself for smallholders as it gave them confidence to express their views, which confirms the findings of other scholars (Cornwall and Pratt, 2011). At the same time, we found that researchers and partners should establish a shared understanding of the definition of small and large farms, and this may vary by locality. Unlike in Karaoi, which benefits from greater proximity to the Almaty market, there were no large farming enterprises in Koram. Unsurprisingly, the challenges of small and large farmers in Koram, as defined locally, overlapped significantly.

Another problem of definition occurs in applying Euroamerican categories as implicitly used in RAAIS to other settings. The practices and understandings of civil society in Kazakhstan do not correspond well to Euroamerican understandings, informed by a strong public-private division (e.g., Hann and Dunn, 1996). For instance, in Kazakhstan a water-users association (WUA) may be established as a nongovernmental organisation [*assotsiatsiya*], yet makes contracts as a private enterprise, works closely with local state authorities, and is often even located in the offices of the local municipality. To consider a WUA as an NGO, then, would be to misrepresent the relations obtaining on the ground, and we opted to classify

WUAs as state organisations. In the event, the head of the WUA in Karaoi wanted to sit with the small farmers, whom he felt he represented, and had to be requested to move groups.

Some selection variables can be controlled, but not gender and age. While it was important to represent the different socio-economic circumstances of farmers (as the main users of the farming system), it was not practically possible to obtain "balanced" representation of gender or age (most farmers in the study area are males, middle-aged and older). These variables – as well as ethnicity and language – became more important when considering the facilitation of workshops. Similarly, it may not be possible to find suitable expertise: a difficulty identifying suitable scientists or NGOs may well indicate that these do not form part of the farming system in this area. Again, these issues expose the situated and culturally determined nature of key notions of representation and social roles in RAAIS.

Participation during workshops. The dynamic of a workshop which brings actors from different positions within a locality will inevitably reflect the power structures and embedded relations of that environment. Yet a successful multi-actor workshop creates a space where these hierarchies can be provisionally suspended and various knowledges elicited (Gaventa and Cornwall, 2006).

Importantly, participants found the workshops to be 'fun', which is an important dimension of learning processes (Bisson & Luckner 1996). They enjoyed the exercises as 'games', and the balance of group discussion and presentation ensured that the workshop was stimulating. This activity-based format meant that participants engaged in a dynamic produced by the workshop rather than the hierarchical situations that obtain in other communicative situations of day-to-day life. Equal weight was given to the contributions of all groups, and deference was not given to powerful stakeholders (for example, state officials were placed last in the ordering of groups on the first poster). The task-based nature of the workshop also meant that grievances could be aired without those responsible having to resolve them. In both workshops, people took home a slightly refreshed thinking on the issues, with comments volunteered

in follow-up interviews like “we wouldn’t have had this kind of conversation”, “we wouldn’t have thought about it in this way” or “we learned something from …”.

Nevertheless, there were ways in which local hierarchies and hierarchies produced within the workshop were evident, which confirms the difficulty of realising the potential of RAAIS and similar participatory approaches in practice (Chambers, 1994b, 1994c). At times, facilitators reproduced hierarchies that the workshops were designed to deconstruct, by, for instance, privileging the perspectives of “authoritative” or “knowledgeable” figures and thus obscuring the marginal knowledges of farmers and others without such social capital. An important part of workshop preparation, then, should entail making explicit, and overcoming, the preconceptions and prejudices of local facilitators. Yet this goes both ways, as participants may treat facilitators differently according to gender, age, ethnicity or language. We matched facilitators to groups according to language spoken, gender, and age. For instance, native Kazakh speakers were appointed to Kazakh-speaking groups and an older authoritative male facilitator was assigned to the group from “state structures”. Finally, we found that within the workshops facilitators could easily dominate group discussions or fill gaps with their interjections. This was particularly a risk in Exercises 5 and 6 (Table 1), where the overall facilitator had most influence in placing cards onto a whiteboard and drawing links between them according to the participants’ opinions. As with all participatory research, this is a matter of prior briefing and careful monitoring within the workshop environment (Appendix 1, 2).

7. Conclusions and recommendations

Overall, we found the RAAIS approach to be an effective diagnostic tool for complex problem analysis in farming systems research, with high potential to be applied to a different complex agricultural problem and socio-cultural and political context from that for which it was designed.

The application of RAAIS to a different problem may entail using a different theoretical framework to inform some exercises. In our case, this meant using typologies derived from climate change adaptation theories as analytical categories to examine adaptation. RAAIS proved versatile enough to adapt to this alternative theoretical framework, providing useful insight into existing constraints and practices.

Notwithstanding, the adaptation of RAAIS to different socio-cultural and political contexts may require more consideration than is apparent in Schut et al.'s publications. While the tool is flexible, researchers need to be aware that RAAIS cannot be applied 'as is' to any setting or problem. Adaptation to context and flexibility may be needed for two purposes. First, in practical terms, one may need to change the workshop length (and thus select particular exercises) or adapt it for different languages. Second, and conceptually more important, one may need to adapt workshop design to different types of actors (for instance, there may be no civil society in the Euroamerican sense implicit in the methodology) and gender or age groups, as well as be aware that seemingly basic concepts like 'farmer', or 'large land-holding' may mean different things in different contexts. The goal here is to strike the fine balance between stimulating and steering a discussion along relevant lines, while not imposing concepts and vocabulary that do not belong to that particular context. We put as much care as possible into the design of the workshop protocol and interviews to ensure locally appropriate categories were used, and also introduced the option "other" in exercises 3 and 4 to allow participants to diverge from our predefined typologies.

Following several scholars (Mosse 1995; Bourke, 2006; Gaventa and Cornwall, 2006; Cornwall and Pratt, 2011), we suggest that a self-critical and conscious approach by the research team and the facilitators is essential for the successful adaptation of RAAIS to different contexts. The creation of suitable spaces (e.g., open and frank debriefing sessions) and tools (e.g., in process documentation or research diaries) is helpful to build the capacity to exercise such self-reflexion. In our experience, the presence of an interdisciplinary and international team was also an aid to reflexivity.

Furthermore in this respect, we found that the training of facilitators, note-takers, and other organisers is much more important than acknowledged in Schut et al.'s publications. There are three main reasons for this. First, when RAAIS is applied in a context in which facilitators are not familiar with participatory research, then there is the risk that the research is not conducted in the spirit of inclusiveness and empowerment that informs RAAIS and participatory methods in general (Chambers, 1994c). In many contexts, therefore, it may be essential to brief facilitators on the epistemological approach that informs the research, even before training in RAAIS specifically. Second, training can prepare the facilitators to overcome existing social relationships, hierarchies, and local power relations, which can significantly affect the outcome of the participatory process (Mosse, 1994), so that they might be provisionally suspended during the workshop (and interviews). Third, RAAIS requires a large team of facilitators and note-takers, and the facilitators cannot possibly control for all social relations and dynamics during the workshop.

Our experience in Southeast Kazakhstan suggests that these considerations can improve the likelihood of RAAIS, and similar participatory research methods, being successfully adapted to different research topics and contexts more broadly.

Appendixes

RAAIS Workshop Protocol and Facilitation guides developed in this study can be found online in English (Appendix 1) and Russian (appendix 2) at http://dx.doi.org/10.1016/j.agsy.2016.11.014

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