Conceptual Aspects of Adaptive and Collaborative Approaches
Reflections from the literature review[1]

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Introduction

Over the past 15 years or so, many different initiatives have emerged to conceptualize adaptive collaborative approaches (ACA) in agriculture and natural resoruce management (ANR) in different parts of developing world. A key concept within ACA has been known as adaptive collaborative management (ACM) that has been recently applied in forestry and other ecosystems. The main idea of ACM and related approaches is to go beyond linear methods of research and extension, to harness learning and collaborative possibilities among actors in the system of natural resource management. All of these approaches are evolving in response to the widespread concern over how research and development (R&D) in ANR sector can be made more effective to combat poverty and environental degradation. The evolution of adaptive collaborative approaches thus indicate a shift away from the technology transfer model that remained dominant since the sixties in the development industry.

Such interactive and learning based approaches have emerged in different disciplinary fields of knowledge, and practical contexts of change and problem-solving. These can be tentatively grouped into the following four categories:

- Social learning (including organizational learning) (SL)
- Adaptive management, adaptive co-management, adaptive collaborative management (AM, ACM)

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- Participatory research, action research and participatory action research (PAR)
- Innovation systems (IS)

Although initiatied in quite diverse contexts, they all share concerns over the uncritical adoption of dominant technology-driven approach to development and resource management. They all emphasize going beyond traditional science (emphasizing research and extension), and the need to bring out change through learning in the real world context. They also have complementary and unique analytical elements and strategies for learning, collaboration and change, wihch can be harnessed for more effective ACA in ANR sectors. The four approaches together cover aspects as diverse as social, political, ecological, psychological and also span different ways of combining research, learning, and action for change and innovation.

The goal of this *update paper* is not to do a comprehensive review of each of these approaches and make a critical assessment of them, but to pick up most relevant elements for the ongoing Research Into Use study on ACM as it relates to 'research into use'. It is hoped that this review will help better understand the theoretical aspects of learning and change, forge better dialogues among the research team – writters, editors and reviewers of the ACM volume now in progress.

Context and scope of review

Poverty reduction and environmental sustainability continue to be the two key issues facing the global community. In the post-War II development era, in order to find solutions to these intertwined problems (poverty and environmental degradation), tremendous resources have been invested in 'research *and* development' ANR sector in the developing world, mostly as part of support from the Northern-based international development agencies. Until recently, much of the R&D has remained within the rubric of technology 'transfer model', informed largely by modernization theory of development that emphasizes the need to transfer western, scientific and formal research based knowledge and technology to the developing world as the answer to the development problems.

It is already two decades or more since the top-down and linear model of development was challenged (Chambers 1994). Despite recent upsurge of participatory innovations in development actions (Chambers 1997) and natural resource management, there is a continuing concern over limited real achievement in terms of local livelihoods outcomes, economic contributions and natural resource sustainability (Cook and Kothari 2001; Escobar 1995, Scott 1998). In many situations, collective

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processes of institutions and policy making fail to address the opportunities to optimize individual and collective benefits from natural resource governance practices. One of the consequences of such failure is that a vast majority of the world's poor who continue to live at the interface between land, forest and water, often have limited access to such vital resources (Scherr *et al.* 2004; Sunderlin *et al.* 2005). There is thus a need for more innovative thinking, approach and practice for policy and research and development interventions in ANR sector, beyond the participatory ideals.

In recognition of such failures, since the late eighties, there has been an increasing appreciation of the need to explore and develop further innovations in participatory approaches to research and development (Biggs and Clay 1981, Biggs 1989, Chambers et al 1986). As a result, there have been major strides to engage and empower the beneficiaries as well as other actors in ANR system in the emergent, interactive processes of learning and innovation. A variety of innovative ideas and practices have surfaced, especially since the beginning of the 90s, in different parts of the developing world, creating a rich repertoire of experience in more adaptive and collaborative approaches to ANR management and policy development. A number of un-conventional epistemological approaches also emerged and became popular such as political ecology (Blaikie and Brookfield 1987), social movements (Peet and Watt 1996), institutional approaches (Agrawal 2000, Ostrom 1990) that brought social and political dimensions into the study and practice of natural resource governance. At both conceptual and practical levels, these approaches have challenged the rigid boundaries between, and the distinctly perceived phases of, research and development, and opened up a whole new approach to doing development. All this provided an impetus to the emergence of holistic, integrated, and collaborative systems of innovation and change.

In this research, adaptive collaborative approach is understood to denote a family of concepts that seek to combine research and various other ways of learning, as well as collaborative actions among multiple actors, operating at multiple scales of decision making and action. The phrase 'adaptive collaborative approach' combines both normative (what needs to be) and analytical aspects (understanding what actually exsits) related to learning and change. The term 'adaptive' is borrowed from wider literature on adaptive management (Lee 1993) to denote a key process of learning in and through the management and governance of natural resources, treating policies and management interventions as experiments, and emphasizing the the need for building an explicit learning and monitoring framework linked to management. The collaborative dimension reflects the inevitable aspect of interaction among various actors as they seek to manage ANR.

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In reality, a range of situations of conflict and collaboration exist, and the dynamics between conflict and collboration becomes even more complex when a planned process of innovation is initiated. Increasingly, 'adaptive collaborative management' has emerged as an approach to combine two dimensions – learning through experience and undertaking collaborative actions, as a normative and proactive approach to innovation and change. But here we seek to invoke ACA as a wider family of approaches, ACM being one among them, and also seek to retain analytical aspects: not just learning but also failure to learn, and not just collabroation but unavoidable conflicts. When we consider ACM analytically, we are interested in understating whether, how and to what extent ANR actors and institutions are likely to be more adaptive and collaborative and under what conditions. Having an analytical edge is important, particularly because the actual situation of resource governance requires closer understanding and continuous research to inform normative aspects of ACA related interventions.

From the historical and evolutionary point of view, we found that the shift towards ACA begins from the realization of the deficit of the dominant mode of traditional scientific research. Due to inaccessibility and limited relevance of such scientific knowledge to localized and practical innovations, on-the-ground ANR actors are prompted to develop willingness and commitment to alternative ways of learning and innovation. In such context, we see ACA as a potential approach that speaks to researchers as well as practitioners, or at least provide a framework to bridge the communication gap, by allowing both formal and 'objectivist' and practical and 'constructivist' approaches to learning and institutional change.

Through the review of extensive literature on ACA, four approaches have been identified as being relevant for the analysis and review. These are neither mutually exclusive nor collectively exhaustive. Not all of them emerged from ANR. It is also difficult to find them as internally coherent. But still looking at the historicity of their evolution, and since our purpose is to draw insights into how learning, adaptation, collaboration and change occurs, it useful to classify them in four approaches as mentioned at the begining. Together they cover diverse contexts in which they have emerged, diversity in issues of focus, unique framework of tools and methods. Some are more directly related to ANR than the others, but still all bring useful aspects. We now briefly introduce these approaches one by one before we come back in the subsequent section to do comparative discussions on key analytical aspects. For each of these approaches, following questions have been conisdered:

- Under what contexts they are generated and produced initially, and how they are evolving over time?
- What are the key outcomes or changes they target?

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- What are the specific strategies, frameworks and tools through which learning is generated and applied?
- What are the key gaps and issues around them?

Social learning

The questions on human learning were first addressed in the field of psychology, and then the research gradually moved to other fields of knowledge and practices – such as organization science and communityy studies, network analysis, and to the context of natural resource management research, practice and policy.

Until the 60s, psychologists emphasized learning as the property of individual cognition and behavior. In a seminal work, Bandura coined social learning to emphasize how human agents learn through social engagement. Challenging the cognitive processes and performance based processes of learning, Bandura (1969) argued for social learning thus:

> "Indeed, if social learning proceeded exclusively on the basis of rewarding and punishing consequences, most people would never survive the socialization process... complex cultural patterns of behavior are, in large part, transmitted and regulated at a social-systems model".

Banudra's main argument was that human learning is possible through 'language, mores, vocational and avocational patterns, the familial customs of a culture, and its educational, social, and political practices'. He thus concluded that human learning is not confined to the property of individual cognition and behavior. This idea moved learning research from individual to social domains.

The individually-focused explanation of learning was later extended in the studies of organizations and communities, which took pragmatic approach to problem-solving and innovation. Organizations began to be seen as the key blocks of social learning, and the ideas of learning organization, organizational learning emerged (Argyris and Schon 1978, Senge 1990). These works discovered that both opportunities and constraints to learning and change lie at the level of organizations and communities rather than at the domain of individual life.

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Extending the social dimension of learning, the concept of ccommunities of practice (Wenger 2000) was populaised, arguing that the success of organizations depend more on 'communities of practice' connecting peoples and groups across a wide social doamin, beyond the formal boundaries of the organizations. As such they were seen as the key building blocks of social learning systems. Here the idea is more in favor of informal network as the domain of social learning than the formal practices and processes taking place within organizations. This looks convincing because since the beginning of history, human beings have formed communities that share cultural practices reflecting their collective learning (ibid, p229). According to this view, communities have at least three shared elements (Wenger 2000): joint enterprise, mutuality and shared repertoire of communal resources – language, routines, sensibilities, artifacts, tools, stories, and style, all of which shape, influence and determine the nature and type of learning at individual, group and societal levels.

But the debates persist on the primacy of individual versus group or organization or community in the process learning. A view challenging this dichotomy is also on the rise inspried by Dewean (Dewey 1916/1966) synthesis of the individual and the social: this approachs proposes a third way wherein individual and the group are in the constant process of creation through experience and reflection (Elkjaer 2003).

In the context of natural resoruce management, KN Lee (1993) linked adaptive management and politics to form the concept of social learning. The work of Rolling also challenged the individually based cognitive models of learning and negotiation (2002). More recently the idea of social learning has been applied in the context of natural resource management (Rolling 1998, 2002; Fisher et al 2007).

There is also an argument to differentiate social learning as per the depth and level of change involved. Transformative Learning Theory emphasizes learning at the level of underlying assumptions and worldviews (Mezirow, 2000). This conception resonates 'double loop' and 'triple loop' learning concepts espoused by Argyris (Argyris and Schon 1978). At the core of Transformative Learning Theory, is the process of "Perspective Transformation", with three dimensions: psychological (changes in understanding of the self), convictional (revision of belief systems), and behavioral (changes in lifestyle) (Clark 1991). It has three phases - critical reflection, reflective discourse, and action (Caffarella 1999, p. 321). It is argued that "Transformative learning is the expansion of consciousness through the transformation of basic worldview and specific capacities of the self; transformative learning is

facilitated through consciously directed processes such as appreciatively accessing and receiving the symbolic contents of the unconscious and critically analyzing underlying premises." (Elias, 1997, p. 3)

In planning and organizational processes, there is a focus on explicit, codified knoweldge. But research shows that knowing in group practice and as part of the interaction of social world cannot always be reduced to knoweldge that is genrated as an outcome (Cook and Borwon, 1999). Existence of such knoweldge was famously articulated by Polanyi (Polanyi 1966) as 'tacit koweldge' and 'doxa'by Bourdieu (1998). From this, scholars have argued that the process of knowing is an important aspect of organizational development, which can be lost if there is an emphasis on knoweldge as an outcome (Cook and Brown, 1999).

As against the rational choice models (whcih consider learning through bargaining and negotiation among the autonomous individuals), ssocial learning perspective emerged as an approach to harness the communicative frontier among human agents (Rist et al 2006). In natural resource governance, it is seen as the the process of framing issues, analyzing alternatives, and debating choices which enables constituencies to reflect on their own and others' values, orientations, and priorities in the context of inclusive deliberation (Daniels and Walker (1996) cited in Muro and Jeffrey (2008)). The scientific adivice itslef is seen as a part of social learning process (Gottschick 2008), with a reorientation of the role of expert to stimulate and clarify the debate rather then provide normative prescriptions (Fischer 2004).

While social learning perspective has informed the identification of several tools in the process of learnign and change – such as open communication, diverse participation, unrestricted thinking, conflict bounding, multiple sources of koweldge, extended engagement, and facilitation – it has not been sufficient for social learning and collaborative management (Schusler et al 2003). In many situations, changes and innovation occur not through learning but through drastic political economic transformation or crisis, and often the chaotic perverse situations do not appreciate and encourage learning based appraoches. In such contexts, the theory of learning should analytically be linked with the theory of lack of learning.

Adaptive management and Adaptive Collaborative Management

Recognizing complexity in the management of ecosystem, researchers and practitioners first felt the need to be adaptive in the management process by paying attention to monitoring the implementation of management deecisions and plans. While the initial attempts, mainly in North America in the

seventies, represent the scientists's efforts to managing ecosystems in an adaptive way, the later approach marked significant switch towards adaptive and collaborative dimensions – addressing how multiple interests and stakes can be reconciled in resource management, not just those of the scientsits and their institutions but of the entire group of stakeholders in the management of natural resources (Brunner et al 2005).

Adaptive management emerged in response to the recognition of complexity in natural resource systems and the appreciation of the need to take experimental approach in the management of natural resource systems (Holling 1978, Walters 1986, Lee 1993, and Gunderson et al 1995). It was initially applied in the context of river basin and natural ecosystem management in the United States and Canada, but then has later been extended to other parts of the World. By now, the approach has gained sufficient maturity, and is often presented as a tool to frame the philosophical, methodological, and practical challenges associated with the management of natural resources (Berkes 2006, Armitage et al 2007)

C.S. Holling's book, Resilience and Stability of Ecological Systems was the first scientific literature published in 1978. Holling advocated an approach to experiment to learn the boundaries of natural systems. The approach was developed through working with resource managers in British Columbia on a number of management experiments and public participation workshops. Walters (1986:8) further elaborated the idea and approach to adaptive management as involving "a continual learning process that cannot conveniently be separated into functions like 'research' and ongoing 'regulatory activities,' and probably never converges to a state of blissful equilibrium involving full knowledge and optimum productivity." Walters (1986:9) saw the value of adaptive management as questioning some of the basic management assumptions. He characterized adaptive management as the process of

- bounding management problems and recognizing constraints;
- representing existing knowledge in models of dynamic behavior that identify assumptions and predictions so experience can further learning;
- representing uncertainty and identify alternate hypotheses in relation to management action and expected outcomes
- designing policies to provide continued resource productivity and opportunities for learning.

As the use of adaptive management has become more widespread and diverse in meaning, Holling and his colleagues have referred to adaptive management as adaptive environmental assessment and management (AEAM). They want to bring the role of assessment back, as they argue that ooften

people think of adaptive management as "learning by doing," but, for Holing, this misses the essential goal of needing to experiment with complex systems to learn from them. AEAM, they claim, eschewes from assuming uncertainty away or seeking certitude, but emphasizes confronting the uncertainty with the centrainty of the process (Gunderson 1999). In braode sense, it is through active learning, accpeting surprises, embracing uncertainity, and continually modifying the management in the light of learning that an adaptive management approach can ehance management effectiveness. At the fundamental level, adaptiveness is seen to emerge from the inherent properties of resilience in ecosystem and flexibility in social system (Gunderson 1999).

With the work of K N Lee (1993), adaptive management was more directly linked to the process of social learning around resource management. He used the metaphor of *compass and gyroscope* to emphasize the interactive process between scientific analysis and civic participation in adaptive management. Lee (1993) has famously described adaptive management as:

> An approach to natural resource policy that embodies a simple imperative: policies are experiments: learn from them. ... Adaptive management takes uncertainty seriously, treating human interventions in natural ecosystems as experimental probes. Its practitioners take special care with information. First, they are explicit about what they expect, so that they can design methods and apparatus to make measurements. Second, they collect and analyze information so that expectations can be compared with actuality. Finally, they transform comparison into learning—they correct errors, improve their imperfect understanding, and change action and plans. Linking science and human purpose, adaptive management serves as a compass for us to use in searching for a sustainable future.

Proponents of adaptive co-management argue that the approach has no closer alternative, given the fact that social and ecological systems are deeply interconnected and co-evolving across spatial and temporal scales (Folke 2007). They criticize contemporary resource and environmental management and associated policies, including economic instruments and incentives, as being preocupied with the concpetion of steady-state views and assumption, which reduces the capacity to deal with the change (Holling 1973, Folke 2006). They hold that levels of organization and decisions in one place inevitably affect people elsewhere (Gunderson and Holling 2002). Actions at one spatial extent and time scale can be subsidized by another time and spatial scales. This is being concpetualised as **Cross-scale dynamics** (Levin 2006, 1992), in which the patterns at the macroscopic level emerge from interactions all the way down to individual agents, which in turn are shaped by macroscopic factors. New insights on cross-scale dynamics are coming from other research as well (e.g. Gunderson and Holling 2002, Brown 2003) in which adaptive co-management is being seen more

as problem-solving process, involving extensive deliberation, negotiation and joint learning (Carlsson and Berkes 2005).

As the idea of adaptive management began to be applied in the developing country context, the need for co-management and collaboration became even more important (Colfer 2005). A particular strand in this context is the Adaptive Collaborative Management (ACM) developed by CIFOR in the context of forest management (Colfer 2005, Fisher et all 2007, Chimere et al 2009). Prabhu et al (2007) outlines the three anchors of an ACM approach: *communication and creation of a vision, social learning and joint action*. They further elaborate the three anchors into seven elements which they applied in the real world contexts:

- All relevant stakeholders are involved in decision making and negotiation and have the 'space' and capacity to make themselves heard.
- Stakeholders effectively communicate and transfer knowledge and skills (in multiple directions).
- Stakeholders implement actions together, as appropriate.
- Stakeholders seek to effectively manage conflict.
- There is shared intentional (i.e., social) learning1 and experimentation in the forest management process, and this learning is consciously applied as the basis for refinements in community forestry management activities and processes.
- Planning and decision making include attention to relationships within and between human and natural systems.
- Planning and decision making clearly reflect links to the 'desired future' and take into account current trends and the inevitability of surprise and uncertainty

After having worked for a deacde with ACM, with ACMers taking it to more complex field, the CIFOR resarchers argue that (Prabhu et al, p 18) "Communication is critical in ACM, not only for enabling the shared vision to emerge, but also because effective communication is the foundation for creating a whole that is greater than the sum of its parts. Effective communication enables diverse actors to share—and ultimately negotiate and create synergies from—their worldviews, goals, values and knowledge".

As the experience with ACM grows, there are more challenges being experienced. Wollenberg et al (2007), through an experience of facilitating ACM in forest management in Malinau, East Kalimantan of Indonesia, argue that it is not always easy to apply AM, because of the weak, uncertain institutional setting and complex and shifting political landscape, which made formal cooperation among the local

actors problematic. They report more flexible and spontaneous strategies of cooperation and engagement. They further argue that, "ironically, ACM is intended to cope with complex external contexts, but has not addressed how to cope with complexity internal to decision-making and management". They report that their capacity to be flexible in their facilitation strategy was the key to working with spontaneous cooperation. They made adjustments through 'muddling through". This resonates with the reflections of ACM researchers who worked in the torbulent period of Zimbabwe during the years before and after the oneset of new millennium – 'the journey is far more important than the destiny' to find the way into the complex, chaotic, uncertain socio-ecological world. As Mandondo and Matose (2008) remark at the end of the book on Zimbabwean ACM:

> "Pre-determined technical solutions are unlikely to succeed if they mere prescriptions, without room for adaptation.....it is not just the solution developed outside the place where it is applied that undermines its potential for success; rather...prescriptive approach precludes two-way communciation. In many ways, ACM is simply about focussing more sharply and effectively on fundamental human processes of communciation, observation, learning and collabroation, and accepting at the same time that failures and surprises are the bumps that will be found along any road".

In summary, as Colfer (2008) outlines, an adaptive and collaborative management has three key elements:

- A horizontal theme in which stakeholders interact and negotiate goals around a resoruce management context
- A vertical theme in which local communities and actors at other scales develop mechanisms for two-way ccommunication, cooperation and conflict resolution
- An 'iterative' or progressive theme wherein stakeholders learn, over time, about the management of their resources and their communities, in the course of actions evolving out of that growing understanding.

Participatory action research

One progressive appraoch to reforming traditional research and extention model of development and change is what is now variously known as action research, participatory research and participation action research. While there is a great variation in the institutional contexts in which they emerged, all of them share a key concern – knowledge imposed from outside is much less relevant for change in the local doamins, and at times, this is jsut an

extension of external control. So what is required is the creation of knowelge through the dialogue and cooperation between researcher, facilitators and the local communities or beneficiaries. PAR originated from worldwide practices and diverse fields of knowledge – adult education, agrarian reform, and agricultural technology (McIntyre 2008).

In social science, the concpetion of 'action orientation' goes back to the work Lewin (1946) who stipulated that researchers should try to change the system as well as generate knoweldge (Lewin 1946). The value of action-orientation in resarch has not only been in terms of contribution to action, but also to enhancing the epistemological quality of knoweldge itslef (White 1989). Scocial science has now a well-accepted tradition of action-oiented research (Small and Uttal, 205, Small 1995). In the field of development, Robert Chmabers popularised the approach to aprticipatoy research, initiatlly through RRA and PRA (1992), which was later repackaged in the form of participatry learning and action.

A more critical and locally engaged approach is participatory action research (Fals-Borda and Rahman, 1991). PAR embraces various key tenets (McIntyre, 2008: p1): a) a collective commitment to investigate an issue or problem, b) a desire to engage in self- and collective reflection to gain clarity about the issue under investigation, c) a joint decision to engage in individual and/or collective action that leads to a useful solution that benefits the people involved, and d) the building of alliances between researchers and participants in the planning, implementation, and dissemination of the research process. These are achieved through a cyclical process of exploration, knowledge construction, and action at different moments through the research process (McIntyre 2008).

Fals-Borda (1987) elaborates the tenets of PAR thus: "Interest in PAR has grown worldwide due to its pertinence to the initiation and promotion of radical changes at the grassroots level where unsolved economic, political and social problems have been accumulating a dangerous potential". He argues that PAR combines "scientific research, adult education and potential action". He adds: "This experiential methodology for life and labor implies the acquisition of serious and reliable knowledge upon with to construct power for the poor and exploited groups and their authentic organizations"...The aim of this combination of knowledge and power are : a) to enable the oppressed groups and classes to acquire sufficient creating and transforming leverage expressed in specific projects, acts and struggles; and b) to produce and develop socio-political thought processes with which popular bases can identify"....These go beyond the academic traditions which have emphasized value neutrality and a positivist objectivity as prerequisites for serious science".....PAR does not negate the need for discipline and continuity in accumulating and systematizing knowledge......however it would induce a reorientation in teleological

terms that would lead into more integrated academic and popular or common-sensical knowledge so that a new type of 'revolutionary science (in Kuhnian terms) becomes a real possibility…".

Learning to interact and organize is a crucial lesson in PAR. Bals-Borda writes: "through actual experience of something we intuitively apprehend its essence, we feel, enjoy and understand it as reality, and we thereby place our own being in a wider, more fulfilling context. In PAR such an experience is complemented by another one – that of authentic commitment..".

While reviewing the commonalities of diverse participatry research, Cornwall and Jewkes (1995) found that "Practitioners take explicitly political stance, focusing on empowering disenfranchised and marginalized groups to take action to transform their lives". Recent work has drawn on feminist research and critical theory to further develop the theoretical basis of PAR.

PAR distinguishes two kinds of change agents: those from within exploited groups and researchers from outside them. Recognizing the power relations within which the activity of research is located, practitioners of PAR work towards a process whereby the conventional subject/object relation is confronted. Different actors, each with their own knowledge, techniques and experiences, work together in dialectical process, through which new forms of knowledge are produced. An emphasis is placed on people's history, within which people can locate themselves and their experiences, and on indigenous conceptualizations. Local people are involved in a process through which they are empowered to take charge of the research process and to organize to implement potential solutions or to take action on concerns. Ideally, through this process the initial agents of change "become redundant . . . that is, the transformation process continues without the physical presence of external agents, animators and cadres (Cornwall and Jewkes 1995).

With the long hisotry and rich repertoire of insights that exist around PAR, it brings together a set of assumptions underlying 'new paradigm' science and in contrast to those of traditional or 'old paradigm' science (Wardsworth 1998): This approach comes in sharp contrast to the notion of positivism that arose to bring certainty and verifiability to a world with enormous complexity (ibid: 1998). If conventional science wanted to give a group of people the power to determine 'truth' for and on behalf of others, the new science arose from a world of multiple and competing versions of truth and reality as a way of assisting people both come to the truth of their own reality, and also to embrace that of others (ibid: 1998). Wardsworth (1998) further argues:

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> "The old adage about science being 5% inspiration and 95% perspiration may hold true enough! The hard sweat and toil comprises the long hours of talking and thinking and sharing the results of our 'fieldwork' with one another. The moment of inspired thinking is when collective values are expressed in a new way of connecting ideas or a new way of 'naming' the world, that advances the collective situation of participants".

Essentially, Wardsworth (1998) summarises, participatory action research is research which involves all relevant parties in actively examining together current action (which they experience as problematic) in order to change and improve it. They do this by critically reflecting on the historical, political, cultural, economic, geographic and other contexts which make sense of it.

Critiques find participatory research as being too concerned with the here and now, and less political and theoretical (Kapoor 2002), and suffers from the problem of 'localism' (Mohan 2004). While the dimension of reserch has paid significant attention in PAR, the issue of participation is less linked. While multiple levels of participation are identified in PAR – such as contactual, consultative, collaborative or collegiate (Cornwell and Jewkes 1995) – there is now an emerging debate towards relocating participation within the paradigm of 'users and choosers' to effective citizenship through which people can exercise their agency to define visions and strategis of change, wihtout necessarily being constrained by the logic of market or the prescriptive boundaries espoused by the experts (Cornwell and Gaventa 2001)

Innovation systems

The innovation systems concept emerged in the field of industrial development in the 70s and 80s, primarily around the national policy context in the West (Sharif 2006). Innovation emerged through a debate over the last 40 years about whether scientific research should drive innovation or there has to be more interactive process between science and many other actors and processes in the economy. Besides, several other theoretical development contributed to the popularization of innovation system (WB 2006: 15): such as new growth theory stressing the importance of increasing returns to knowledge accumulation; increasing consensus that knowledge generation is an evolutionary process involving the interaction between research and non-research actors; and social capital theories revealing the possibilities of reducing transaction costs in the economy.

Recent empirical work has extended the innovation systems approach. It is now being used to study not only national innovation systems in industrialized country manufacturing but also developing-country agriculture. As traditional barriers to trade and investment have been dismantled, innovation has

diffused around the globe (World Bank 2006: 13). The concept is slowly being carried in the context of agriculture, but not so much yet in the overall ANR sector.

At the most basic level, the concept of innovation draws attention to (World Bank 2006): (1) the totality of actors needed for innovation and growth, (2) consolidating the role of the private sector and the importance of interactions within a sector, and (3) emphasizing the outcomes of technology and knowledge generation and adoption rather than the strengthening of research systems and their outputs. As Spielman, Ekboir and Davis (2009) argue, "an innovation system framework shifts the analytical emphasis from a conventional linear model of knowledge and technology transfers (from researcher to extension agent to farmer) to a more complex, process-based systems approach."

Popularity of innovation systems perspectives on agricultural research and technological change in the developing countries is growing, both because of application of concepts in understanding and facilitating agricultural development, as well as serious attention and endevours of scholars to promote the approach as a corrective measure to the failure of conventional research and extension driven approach to agricultural development (Biggs and Clay 1981). The perspective also challenges earlier claims that technological change drives social and economic development, suggesting instead that technological change is embedded in institutional contexts of learning, power, trust, and interactions among various sub-systems (Hall et al 1998; Hall et all 2003). Box 1 summarizes key developments in the innovation systems approach.

Box 1: Hhistory of innovation system development in the context of agroculture since the late 70s

- Biggs and Clay (1981) and Biggs (1989) offer an early framework of the approach by introducing several key concepts of institutional learning and change, and the relationship between innovation and the institutional milieu in which innovation occurs. This has become central to later innovation systems studies on developing-country agriculture.

- Studies by Hall and Clark (1995), Hall et al. (1998, 2002, 2003), Johnson and Segura-Bonilla (2001), Clark (2002), and Arocena and Sutz (2002) introduce the innovation systems approach to the study of developing-country agriculture and agricultural research systems.

- Regional and national applications of the innovation systems approach include Sumberg (2005), Roseboom (2004), Chema, Gilbert, and Roseboom (2003), Peterson, Gijsbers, and Wilks (2003), and Hall and Yoganand (2004) for Sub-Saharan Africa; Vieira and Hartwich (2002) for Latin

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> America; and Hall et al. (1998) for India.
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> - Hall et al. (2002) provide an in-depth study of the institutional and organizational learning processes that stimulated the diversification of agricultural research financing in India to include new actors (e.g., medium-sized firms and producer cooperatives) and new modalities (e.g., contract research, public-private partnerships).
>
> - Clark et al. (2003) unlock the mysteries of a successful donor-funded project in post-harvest packaging for small farmers in Himachal Pradesh, India, by studying the institutional learning and change processes that were incorporated into the project design".
>
> Source: adapted from Spielman et al (2009)

Proponents claim that the shift in the emphasis from a unidirectional technology transfer approach to a more complex, process- based systems approach is appropriate for the study of developing-country agriculture because it can help policymakers, researchers, research managers, donors, entrepreneurs, and others identify and analyze new ways to encourage innovation. These approaches can work even with the data limitations in developing countries. More importantly, they can go a long way in fostering development and reducing poverty in developing country agriculture.

Since agricultural innovation involves institutions beyond the public sector research, and innovation emerges from the interface between research and practice, partnership really matters in innovation development (Hall et al 2001). This approach has inspired and reframed the whole way of doing development from defining problem to doing research to facilitating change. This is exemplified in the conclusion of Hall et al (2007) that fodder scarcity in India and many other regions is indeed a problem of innovation capacity scarcity, and not the problem of lack of technology or individual production capacity of a farmer. This conclusion implies a radical shift in development research and capacity building interventions.

While there is a resurgence of local knowledge movement in the development, proponents of innovation systems approach claim that an effective strategy should accord primacy neither to local knowledge nor technology, but to the system itself. As Hall and Clark (2010) asserts: "Our account does not give primacy to technology as the driver of change, nor does it give primacy to the knowledge of farmers; rather, while recognising the importance of these it gives primacy to the capacity to respond to changing circumstance through adaptation and innovation."

Conceptual Aspects of Adaptive and Collaborative Approaches
Reflections from the literature review[1]

Innovation systems thinking has opened up new ways of thinking about public policy in development. As Hall and Clark (2010) argues:

> "The challenge for public policy is therefore two-fold. Firstly, to find ways to be alert to emerging innovation practices that, by definition, are invisible to most mainstream thinking and sources of information that policy draws upon. Secondly, to find ways to provide the nurturing environment that can move these new products and services and new innovation capacities from the margins to the mainstream and in doing so accelerate the learning process through which innovation capacity is enhanced. An implication of this is that public policy needs to shift from an orchestration role in which it sets the conditions from which innovation will emerge, to a more pro-active role where it supports new patterns of innovation behaviour."

They further argue:

> "the innovation systems literature, with its foundations in complexity theory, is a major epistemological departure from the traditional, neoclassical studies of technological change that are often used in research driven by National Agricultural Research Systems (NARS) and Agricultural Knowledge and Information Systems (AKIS). The NARS and AKIS approaches, for example, emphasize the role of public-sector research, extension, and educational organizations in generating and disseminating new technologies. Interventions based on these approaches traditionally focused on investing in public organizations to improve the supply of new technologies. A shortcoming of this approach is that the main restriction to the use of technical information is not just supply or availability but also the limited ability of innovative agents to absorb it. Even though technical information may be free and freely accessible, innovating agents have to invest heavily to develop the ability to use the information".

Overall review of various adaptive collaborative approaches

Having outlined the key features of the four adaptive collaborative approaches, we now turn to distill key insights in relation to a) underlying assumptions, b) outcomes anticipated, c) general programme of intervention, and c) strategies for production and use of knowledge. We identify common and unique elements and then use these to make synthesis in the subsequent section.

7.1 Commonalities and differences

Conceptual Aspects of Adaptive and Collaborative Approaches

Reflections from the literature review[1]

Table 1. Comparative review of various adaptive and collaborative approaches

ACA/Aspects	Social Learning	Adaptive management	Participatory Action Research	Innovation Systems
Emergence – time	70s	70s	40s/70s	80s
Triggering factors such as the emergence of the appraoch	critique of individual focused, cognitive and behavioural theories of learning (Bandura)	lack of monitoring resource management and problems of uncertainty, and need for experimental knoweldge.	lack of action orientation of science (Lewin), and development research and intervention (Fals-Borda)	technology-driven agricultural development practices (Biggs,??)
Major shifts	organizational learnng, action science, communicative action,	co-management, collaborative management, collabroative inquiry, cross-scale dynamics, marriage with social learning, adaptive goverannce	PRA to PLA, users to citizens, research and social movement, expert and democracy	innovation capacity, learning processes, institutional embedding and cross-system interactions
Role of research	Researchers as co-learners in the social systems and networks	researchers set up monitoring plans, reflection and sharing,	research agenda defined locally and put into use	technical research as part of wider innovatin system, stdies into innovation systems, not technology generation and adoption, relocate research in social and policy domain.
Key issues and gaps	Still limited consideration of politics, focus on normative and less pedagogic; silent on strcutural constraints to learning	confusing notion of 'management', little exploratin of adaptation adaptation dynamics; limited treatment of conflicts,	Sufffers from localism, limited replicability, limited policy link	focus on economic change, links with politics poor, limited concpetualization of the agency of change and innovation.
ARN sector applied	forest, biodiversity, water (?), NRM	forest, biodiversity, water, fisheries	agriculture, forest	agriculture

Assumptions and presuppositions

- All approaches assume that ANR management and chage is a complex system phenomenon, where linear concpetison of input and utput does not work.

- Action researchers share with critical theory that the social reality is historically constructed.

- Adaptive management and adaptive co-management cemphasizes the links between social and ecological system more than any other approaches.

- Innovation system approaches pay attention to economic innovation including value chain connectivity more explicitly than any other approaches.

- There is now increasing tendency to recognize the embeddedness of learning, adaptation and collaboration – such as innovation systems in wider social, political and institutional contexts (Spielman 2009).

- Innovations systems literature is slowly moving from it's primarily rational-choice focus and the classic problems of economism (Speilman 2009) to learning and cross-scale dynamics. Social learning and PAR recognize the productive frontier in the pedagogic interaction among the actors. Earlier modes of individual focused, agregated modes of learning now being criticized in favor of shared learning and interdependence (SL: Lewees and Pyburn 2002: p 11).

- PAR assumes, more than any other approaches, that people have strong agency but may be unaware of the constraints to freedom (Ozanne and Saatiglue, 2008)

- While IS finds 'attitude and practices' as major obstacles in innovation (WB 2006: ix), PAR researchers use critical pedagogic tools and critical dialogues to discover useful knowledge and transform the perception of local people (Freire 1970, Fals-Borda 1987).

- All approaches have done limited exploration of difference and inequality – tenecny conceptualize community as homogeneous entity.

- Social learning and PAR emphasize expereiencial roots of knowledge (SL), and knowledge derived from trying to change the system (PAR). ACM also comes close to this.

- Learning is related to interaction between people (SL), and between people and the natural world (AM).

- Agency of change is identified in PAR - two types of change agents work in tandem through praxis. Other aproaches often emphasize systems without properly locating the agency of change.

Anticipated outcomes

- innovations systems approaches focus on innovation capacity, recommends to respond to chaning circumstances to adaptation and innovation, identify emerging innovation practices and enable their adpation

- Social learning approaches focus on behavioural changes, changes in learning processes, apreciation of consicous learning, seeking surprises, taking failure as source of learning, learning as intrinsic process of human life (lieflong learning); emphasis on moving from from multiple/distributed to shared cognition.

- Innovation systems focus on institutiional change and economic efficiency

- PAR assumes that solution lies in the local, where as other approaches see in the wider system.

- While PAR focuses on critical learning and reflexivity, **innovation system** seeks changes in social, institutional, technological around a particular economic issue.

General principles of action and process

- Innovation can comprise radical improvements, but usually consists of many small improvements and a continuous process of upgrading (WB 2006: 15). These improvements could be technical, managerial, institutional or policy nature.

- All emphasize ccontext-specific principles of intervention (IS becoming more emphatic on this)

- IS proposes a series of interventions: initiating, experimental, interventions to build on or nurture emerging opportunities, remedial, maintenance.

- The innovation systems concept recognizes that a) there is an important role for a broad spectrum of actors outside government; b) the actors' relative importance changes during the innovation process; c) as circumstances change and actors learn, roles evolve; d) actors can play multiple roles. "Innovation emerges from interaction and knowledge between research and entrepreneurial organizations in the public and private sector" (hall et al 200x – edited volume: 3)

- ACM follows the strategy of muddling through in complex and uncertain situation (Chimere et al 2008: 468).

- All ACAs consider social reality as social systems (IS, AM). Learning organization also presupposes systems. **adaptive management also consider** socio-ecological systems at different scales (AM) as the unit of action and learning

- PAR prefers to start with local problem and issue, and at community level

- ACM (Chimere et al 2008): emphasizes the importance of facilitating iterative feedback loops between research, local experience and policy adjustments as a means for strengthening positive interactions between cooperation and adaptation. (470).

- AM/ACM considers policy itself as an experiment to be framed under the learning and action approach (AM).

- social learning (comunities of practice and learning organization) recognize and allow informal, evolutionary processes of change (SL).

- Emerging policy themes for change ACAs are being applied – decentralization (IS, AM); devolution, poverty-environment relations, pro-poor enterprises, effective resource management and productivity, value chain, social equity

- Approaches are not explicit in providing a possible typology or taxonomy of actors, and the possibility of conflicts and collaboration among them in various action situations. IS has recognized the need to have such taxonomies (Spielman). AM presupposes expert or scientists doing the management, while ACM extends all stakeholders to be engaged. But this could also dilute the political stakes of right holders – the actors are structurally and politically differentiated in the field of power, and question arises as to how the approach should actually enable these differentiated actors to participate in the process such that equity is realized.

- In ACM/AM, there is a cncept of 'bounded conflicts' that recognizes conflict as an essential part of learning if properly bounded and put within the limit.

- In situation of conflict, PAR advocates that the extenral facilitator/researcher should take side of the exploited group (PAR). Other approaches remain neutral at the level of action, and focus at system or policy level.

- In every human institution, knowledge and power are inextricably linked factors, and the treatment of knowledge in isolation gives an incomplete view of learning and innovation system. Power is grounded in diverse dimensions of social class – such as caste, economic assets, symbolic capitals (such as social status), gender and ethnicity, to varying degrees. Knowledge-power nexus is enacted, contested and resisted in day-to-day governance practices. Several of the reported tensions in innovation processes – such as scientific versus indigenous/lay knowledge, theoretical versus practical knowledge – are actually a result of underlying power relations among the social agents. All the four approaches are a bit short on the power dimension.

- On enabling and constraining factors, crisis or disorienting dilemmas may help trigger learning in social learning and ACM approaches (Mezirow).

- ACM and innovation systems coem back again and again to see individual attitude and perceptions [(ACM – McDougall, 2007) and IS (Hall)] as key factors affecting learning and innovation.

Production and application of knowledge

- Adaptive management specifically applies experimental approach to learning, partly because it focuses on the management of complex natural systems linked with social systems.

- Social learning emphasizes communities of practice, networking, and communication as the major strategies of producing knowledge.

- PAR seeks to put the questions of local people and those to be empowered to guide the research process.

- Innovation systems focus not on specific knowledge or technology but the systems of interaction among actors who share a common system of resource management and production value chain.

- Failure is also recognized as source of learning while experimenting (AM, SL).

- While ACAs recognize that the interventionist has to be clear about the goals, it is PAR that explicitly advocates for the PAR practitioner to align themselves with the poor and disadvantaged groups while producing knowledge and action.

- IS stipulates that formal research is only one among the many functions of innovation, and it is often other functions rather than the research that kicks of change (IS: Hall et al).

- PAR also emphasizes that researchers should follow 'engaged scholarship' (PAR).

- Increasing focus on tacit knowledge as a worthwhile resource (IS, SL).

- All these approaches appear to be challenging some orthodox conventional counterparts. IS challenges linear technology transfer models. AM challenges linear, science-driven models of resource management. Social learning challenging cognitive, individually-focused, organizationally bounded approaches to learning. PAR challenges extractive science.

- All approaches have their own methodologies (IS) – social network analysis, innovation histories, cross-country comparitions; and game theory modeling (Spielman 2009).

- All approaches go beyond positivism, and seek communicative engagement, but vary in respect of defining the levels of intervention in knowledge making.

- IS starts with some innovation in mind, whereas PAR starts with some practical problems of people.

- IS could be either orchestrated or opportunity-driven. In all the other approaches, there is a broad distinction of insider and outsider interacting in the process of learning and action. PAR also believes in the local control of the process, without any continuity of support from outside, at the later stages of the cycle.

- Production of double loop and triple loop learning (SL) (Argyris and Schon 1978)

- The transition to ACM at higher scales is slower and challenging (McDougall, 2007: 41). Transition can be better facilitated when change agents are skillful as well as have external connections: (p42).

Critiques

- Danger of localism (Mohan) – especially PAR

- Local micropolitics may affect knowledge generation – elite may be disproportionately benefit.

- Not all behavioral change result from social learning

- Consensus and shared learning may not be feasible and even it is so, may not lead to progress, as we need competition and conflict for change (Muro and Jefrey 2008). Penalties or incentives might prove better than social learning (Leweuwis 2000 cited in Muro and Jeffrey (2008).

- All focus on systems at the expense of the agency of change

- Little consideration of issues related to rights and power and inequality

- Emphasis on interventionist and research functions and less exploration of the theory of spontaneous change

Towards synthesized analytical framework to understand adaptive and collaborative approaches

We are not only interested in how systems adapt under natural conditions, but also seek to find conditions, facilitative processes and policy frameworks that support or enable adaptive systems. These lead us to conceptualize two systems linked to each other – enabling system (such as policy) and operational system (local resource management system) this is similar to what Agrawal and Ostrom conceptualize as 'constitutional choice' and 'collective/operational choice' in natural resource based collective action (Agrawal and Ostrom 2001). Of course the higher order enabling system itself could be following another level of adaptive and collaborative approach, so there is a need to define (not in strict sense) a system that is a focus of analysis and action, and other supportive/constraining systems around it.

While more analysis is needed to suggest a more appropriate framework, current reflections identify that ACA analytical framework could comprise eight elements:

1) **Outcomes**: durable changes in socioeconomic and environmental conditions
2) **Innovation processes**: the interplay between actors and organizations and their corresponding knowledge systems to understand, negotiate institutional arrangements, practices, technologies etc
3) **Conflicts and collaboration**
4) **Actors**, their attitudes, orientations, preferences
5) **Context of ANR management** – social, cultural, ecological, political, economi, historical
6) **Enabling/constraining conditions**: Policy and regulatory interventions
7) **Cross-scale** dynamics
8) **Overall quality** and property of the adaptive collaborative appraoch

Fig 1. Adaptive collaborative approach for ANR innovation: key analytical elements
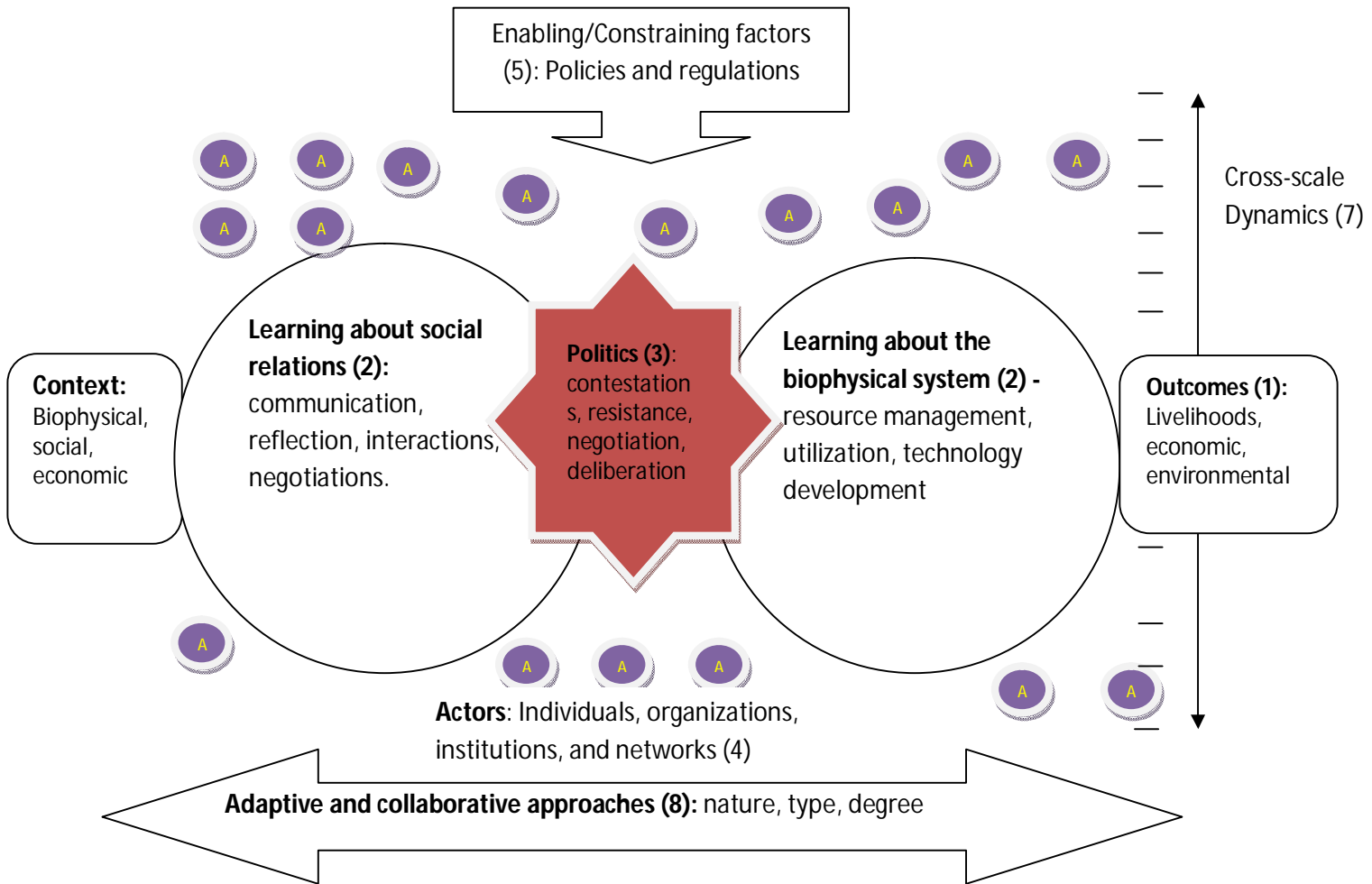
Looking at the long traditions of the four approaches to learning and action we reviewed in the previous section, it appears that there are at least a few important lessons coming out of it.

- First, traditional social science is facing ethical, epistemological and political dilemmas. If social science is to be brought into the service of society, it has to take some kind of action orientation. This is not only for the relevance point of view, but also from the point of view of better understanding the reality beyond the positivist conception of the truth. We need a not a theory of truth, but a theory of learning that helps us advance towards understanding the relationship among people and between the people and the ecological systems in an integrated way.

- Second, there is a huge potential to learn and innovate, and hence there is a scope for intervention. We cannot simply wait for a system to change itself through evolutionary processes and under the selection pressure built up naturally. Interventions could take a wide variety of forms, including research itself, policy, entrepreneurship, actor interfaces coalitions and the like. Learning from some contexts will offer insights to others though not necessarily in the form of prescription. Translating lessons of one context into reflective insights in other requires a different paradigm of action and learning – for which there is already such a huge repertoire of insights from around the four approaches reviewed, and beyond.
- Neither localism not globalism alone can address the problems of ANR. We need to ground action and learning process at the local context, but also engage with the global discourses that produce or frame local knowledge systems. Acting should be seen as a way of transforming the self as well as the others.
- Power matters in many diverse ways, including in the very process of transformation and empowerment.
- Ecological dimension needs to be better integrated with the social; we need to explore ways to understand and facilitate how socio-ecological interactions take place at multiple scales.
- Action should be accompanied by monitoring and reflections. The process of empowerment should be linked with constructing social realities.

Concluding remarks

Recognizing the need for exploring and promoting approaches that can help us understand and facilitate innovations in ANR, this paper has reviewed various adaptive collaborative approaches that combine different types of learning systems and innovation processes. This review sought to identify and characterize these approaches and distill key insights from them.

It is found that there is now a well-established theoretical approach and a set of practical methodologies for combining different systems of knowledge in a way that generates and maximizes innovation outcomes. In view of the continuing challenge of achieving desired poverty reduction outcomes and sustainable natural resource management in the developing world, a diversity of adaptive collaborative approaches are emerging and are being put into use in various contexts.

The ACAs framework emphasize that: a) research is one aspect of innovation system and there are many different ways of navigating the world for innovation, b) there is a need for language and mechanisms through which practitioners and researchers can better communicate with each other in more active innovation processes; c) innovation processes have to confront complex social systems and realities of power relations, and hence the tendency to emphasize a normative framework of change should be tempered with analytical framework that provides critical reflections and empowerment opportunities to those occupying disadvantaged positions in the innovation systems; d) there exist a vast repertoire of knowledge on how adaptive collaborative approaches can work in different contexts, but still little empirical studies informed by a full spectrum of ACA toolkits.

The review also suggests a radical reframing of ongoing research approaches, policy processes, advocacy coalitions around ANR governance. Actors taking different stances can do much better to contribute to innovation processes if all become more adaptive and collaborative in their behavior and practices. But the context of ANR governance is not always supportive to ACAs at local level, and there is a need for taking cross-scale dynamics more seriously and also to consider non-learning drivers of change in the system.

The approaches vary in their suggestions to integrate knowledge and action at different scales – from relying on the endogenous political pressure for change (as in the case of PAR) to generating hard evidence through ongoing monitoring for policy change (as in the case adaptive management).

The review also looked at the relative strengths and weakness of various adaptive collaborative approaches. While the existing approaches are found to be strong in enhancing learning and collaboration, especially in situations where underlying political and institutional contexts are not too constraining, there is still a shortfall of thinking and methodology that can allow such approaches to work in more difficult situations. While all approaches recognize the need to identify and harness the opportunities for minimizing conflicts and enhancing collaboration among actors acting at different scales and domains of the innovation systems, there is still a long way to go in terms of making this practically effective and successful. More importantly, there is still limited dialogue among diverse approaches and there is an opportunity to forge interactive learning among these diverse strategies of learning and change.

References

Agrawal, A. (2001). Common property institutions and sustainable governance of resources. World Development 29(10): 1649-1672.

Argyris, C. and D. Schon (1978). Organizational learning: a theory of action perspective. Reading, Addison-Wesley.

Arocena R, Sutz J. Innovation systems and developing countries. In: DRUID Working Paper No. 02-05. Aalborg, Denmark: Danish Research Unit for Industrial Dynamics, Aalborg University; 2002.

Berkes, F; J Colding and C Folke (2000). Rediscovery of ecological knoweldge as adaptive management. Ecological applications, 10 (5):   1251-1262

Biggs SD, Clay EJ. Sources of innovations in agricultural technology. World Development 1981;9(4):321–36.

Biggs SD. A multiple source of innovation model of agricultural research and technology promotion. Agricultural Administration (Research and Extension) Network Paper. London: Overseas Development Institute; 1989.

Biggs, S. D. and E. J. Clay (1981). "Sources of innovation in agricultural technology." World Development 9(4): 321-336.

Blaikie, P and H Brookfield. (1987) Land Degradation and Society, London,

Bourdieu, P. (1998) Practical Reason: On The theory of Action, Cambridge, Polity

Brown, J and P Duguid (1991) Organizational Learning and Communities of Pracice; toward a unified view of working, learning and   innovation. organization science 2 (1): 40-57

Brown, K. (2003). Integrating conservationand development: a case of intitutional misfit. Frontiers in Ecology and Environment, 1:479-487

Brunner, R, T Steelman, Lindy Coe-Juell, Christina Cromley, Christine Edwards and Donna Tucker (2005). Adaptive Governance: Integrating Science, Policy and Decision-making. Columbia University Press.

Carlsson, Lars and Fikret berkes (2005). Co-management: concpets and methodological implications. Journal of Environmental Management, 75: 65-76

Chambers, R. (1992). Rural Appraisal: Rapid, Relaxed, and Participatory. Institute of Develoment Studies discussion paper no 311, Brighton, UK

Chambers, R. (1997) Whose Reality Counts? Putting the Last First, London,

Chambrs, R; A Pacey, and L A Thrupp, L. A. Farmer first: farmer innovation and agricultural research.IT Publications, London

Chema S, Gilbert E, Roseboom J. A review of key issues and recent experiences in reforming agricultural research in Africa. Research Report 24. The Hague: ISNAR; 2003.

Chimere, M, T Aseh and R Prabhu. 2009. In search of common ground: Adaptive collabroative management in Cameroon. Bogor, Indonesia: Center for International Forestry Research (CIFOR).

Clark N, Hall A, Sulaiman R, Naik G. Research as capacity building: the case of an NGO facilitated post-harvest innovation system for the   Himalayan hills. World Development 2003;31(11):1845–63.

Clark N. Innovation systems, institutional change and the new knowledge market: implications for Third World agricultural development. Economics of Innovation and New Technology 2002;11(4–5):353–68.

Colfer, C. (2008) Adaptive Collaborative Management can help us cope with climate change. CIFOR infobrief, No 13.

Colfer, C.J.P. (2005). The Complex Forest – Communities, Uncertainty and Adptive Collaborative Management. Washington and Bogor: RFF and CIFOR.

Cook, B and U Kothari (2001) The Case for Participation as Tyranny. In Cook, B and U Kothari, (Eds.) Participation: The New Tyranny. Second (2002) ed. London and New York, Zed.

Cook, Scott D N and JS Brown. (1999) Bridging epistemologies: the generative dance between organizational knoweldge and organizational knoweldge

Cornwall, A and John Gaventa (2001). From Users and Choosers to Makers and Shapers: Repositioning Participation in Social Policy. IDS   working paper 36, Institute of Development Studies, Sussex.

Cornwell, A., Rachel Jewkes (1995) What is participatory research? Social Science and medicine, 41(12): 1667 – 1676

Dewey, J. (1916/1966). Democracy and Education: An Introduction to the Philosophy of Education. New York, The Free Press.

Escobar, A. (1995) Encountering Development: the Making and Unmaking of the Third World. Princeton: NJ, Princeton University Press.

Fals-Borda, O and M A Rahman. (1991) Action and Knowledge: Breaking the Monopoloy with participatory action research. London: Intermediate Technology

Fals-Borsa, O. (1987) The Application of Participatory Action-Research in Latin America. International Sociology, 2 (4): 329-347

Fischer, F. (2004). Professional Expertise in a Delieberative Democracy: Facilitating Participatory Inquiry. The Good society, 13 (1): 21-27.

Fisher, R; R Prabhu and C McDougall. (2007). Adaptive Collaborative Management of community forests in asia: Experiences from

Nepal, Indonesia and the Phillippines. Bogor, Indonesia: CIFOR

Folke, C. (2007). Social-Ecological systems and adaptive governacne of the commons. Ecological research, 22: 14-15

Freire, P. (1970) Pedagogy of the oppressed, New York: Continuum, 1970

Gottschick, M. 2008. Participatory Sustainbaility Impact assessment: scientific advice as a social learning process. Systematic practice   and action research, 21: 479-495

Gunderson, L. (1999) Resileince, Flexibility and Adaptive Management – Antidotes to suprous certitude? Conservation Ecology 3 (1): 7   online URL: www.consecol.org/vol3/iss1/art7

Habermas, J (1984). The theory of commuicative action – volume 1 (translated by T McCarthy). Beacon Press, Boston.

Hall A, Sivamohan MVK, Clark NG, Taylor S, Bockett G. Institutional developments in Indian agricultural research systems: emerging   patterns of public and private sector activities. Science, Technology and Development 1998;16(3):51–76.

Hall A, Sulaiman R, Clark N, Sivamohan MVK, Yoganand B. Public–private sector interaction in the Indian agricultural research system: an innovation

Hall A, Sulaiman R, Clark N, Yoganand B. From measuring impact to learning institutional lessons: an innovation systems perspective on   improving the management of international agricultural research. Agricultural Systems 2003;78:213–41.

Hall AJ, Clark NG. Coping with change, complexity and diversity in agriculture: the case of Rhisobium inoculants in Thailand. World   Development 1995; 23(9):1601–14.

Hall AJ, Yoganand B, et al. New institutional arrangements in agricultural research and development in Africa: concepts and case   studies. In: Hall AJ, editor. Innovations in innovation: reflections on partnership, institutions and learning. New Delhi and   Andhra   Pradesh, India: CPHP/ICRISAT/NCAP; 2004.

Hall, A., M. V. K. Sivamohan, et al. (1998). "Institutional developments in Indian agricultural R and D systems: Emerging patterns of   public and private sector activities." Science, Technology and Development 16(3): 51-76.

Hall, A., V. Rasheed Sulaiman, et al. (2003). "From measuring impact to learning institutional lessons: An innovation systems   perspective on improving the management of international agricultural research." Agricultural Systems 78(2): 213-241.

Hickey, S. and Mohan, G. (2004) Relocating Participation within a Radical Politics of Development: Citizenship and Critical Modernism,   in Hickey, S. and Mohan, G. (eds) Participation: from tyranny to transformation?, Zed Press. Intermediate Technology, London.

Johnson B, Segura-Bonilla O. Innovation systems and developing countries: experiences from the UDESCA Project. In: DRUID Working   Paper 01-12. Aalborg, Denmark: Danish Research Unit for Industrial Dynamics, University of Aalborg; 2001.

Kapoor, Ilan. (2002). The devil's in the theory:a critical assessment of Robert Chambers work on participatory development. Third World Quarterly, 23 (1): 101 - 117

Levitt, B and J March (1988). Annual Review of Sociology 14, 319-340

Leweis, Cees, and Rhiannon Pyburn. (2002). Social learning for rural resource management. In Whellbarows of Frogs. In: C Lewis and R Pyburn, Wheelbarrwos full of frogs: social learning in rural resource management. P 11 – 20.

Lewin, Kurt (1946). Action research and minority problems. Journal of social issues, 2 (4), 34-44

Maarleveld M and C Dangbégnon (1999). Managing natural resoruces: A social learning persepctive. Agriculture and Human Values 16   93): 267-280

Mandondo, Alois and Frank Matose. (2008). A comparative analysis of adaptive natural resoruces management in Zimbabwe. In: Mandondo et al (2008). Bogor, Indonesia, CIFOR, p 119-132

Mandono, Alois, R Prabhu and F Matose. (2008). Coping Amidst Chaos: Studies on Adaptive Collaborative Management from   Zimbabwe. CIFOR, Indinesia.

McDougall, C; H Ojha; R.K.Pandey, M.R.Banjade and B.H. Pandit. (2007). Enhancing Adaptiveness and Collaboration in Community   Forestry in Nepal: Reflections from Participatory Action Research. In: R J Fisher: ACM in Asia, CIFOR and RFF Methen and   Co Ltd.

Mezorow, J.(2003). Epistemology of Transformative Learning.

Nonaka, Ilkijiro (2007). The knowledge-creating economy. harvard Business Reivew July-August 2007

Ostrom, E. (1990). Governing the Commons: the Evolution of Institutions for Collective Actions. Camridge, New York and Melbourne,   Cambridge Univeristy Press.

Ozanne, J. L. and B. Saatcioglu (2008). "Participatory action research." Journal of Consumer Research 35(3): 423-439.

Peet, R. and M. Watt (1996). Liberation Ecologies: Environment, Development, Social Movements, . New York, Routledge.

Peterson W, Gijsbers G, Wilks M. An organizational performance assessment system for agricultural research organizations: concepts, methods, and procedures. ISNAR Research Management Guidelines 7. The Hague: ISNAR; 2003.

Polanyi, M. (1966). The Tacit Dimension. New York, Double Day and Company. Political ecology has less to offer as alternatives than to criticize.

Prabhu, R; C McDougall and R Fisher. (2007). Adpative Collabroative Management: A Conceptual Model. In: Fisher et al (2007),

p16-51.

Ramirez R and M Fernandez (2005). Facilitation of Collaboration Management: reflections from practice. Systematic practice and action   research 18 (1): 5-20

Rist S, M Chidambaranathan, C Escobar, U Wiesmann and A Zimmermann (2006). "It was Hard to Come to Mutual Understanding . .   "— The Multidimensionality of Social Learning Processes Concerned with Sustainable Natural Resource Use in India, Africa   and Latin America, Systematic Practice and Acttion Research (2006) 19:219–237

Röling, N. (1998). Extension Science. Cambridge, Cambridge University Press.

Röling, N. (2002). Beyond The Aggregation Of Individual Preferences: Moving From Multiple To Distributed Cognition In Resource Dilemmas. Wheelbarrows full of frogs. Social learning in rural resource management. C. Leeuwis, and Pyburn R. Assen,   The Netherlands, Koninklijke Van Gorcum.

Roling, N. Towards an interactive agricultural science. The journal of Agricultural Education and Extension, 2 (4): 35-48

Roseboom H. Adopting an agricultural innovation system perspective: implications for ASARECA's strategy. Uganda: ASARECA; 2004.

Scherr, SJ; A White, and D Kaimowitz, D. (2004) A New Agenda for Forest Conservation and Poverty Reduction. Washington D. C.,   Forest Trends, CIFOR and IUCN.

Schusler, T, D Decker and M Pfeffer. (2003) Social learning for Collabroative Natural resource management. Society and natural   resources, 15: 309-326.

Scott, J. (1998). Seeing Like a State: How Certain Schemes to Improve Human Condition Have Failed. New Haven and London,   Yale University Press.

Senge, P (1990). The Fifth Discipline: The art and practice of the learning organization. Doubleday, New York, USA.

Sharif, Naubahar. 2006. Emergence and development of the National Innovation Systems concept. Research Policy, 35: 745-766

Small, Stephen and Lynet Uttal (2005). Action-oriented research: strategies for engaged scholarship. Journal of marriage and family,   67(4): 936-948.

Small, Stephen. (1995). Action-oriented research: models and methods. Journal of Marraige and Family, 57 (4): 941-955

Spielman, D; Javier Ekboir and Kristin Davis. (2009) The Art and science of innovation systems inquiry: applications to Sub-Saharan   African agriculture. Technology and society, 31: 399-405

Sumberg J. Systems of innovation theory and the changing architecture of agricultural research in Africa. Food Policy 2005;30(1):21–41.

Sunderlin, W. D., A. Angelsen, et al. (2005). "Livelihoods, forests, and conservation in developing countries: An Overview." World   Development 33(9): 1383.

Systems perspective on institutional reform. In: Byerlee D, Echeverrı´a R, editors. Agricultural research policy in an era of privatization.   Oxford: CABI; 2002.

Vieira LF, Hartwich F. Approaching public–private partnerships for agro-industrial research: a methodological framework. Costa Rica: ISNAR; 2002.

Wadsworth, Yoland (1998) What is participatory action research? Action research international, Novermber 1998, paper 2.

Walter C. (1986) Adaptive management of renewable resources. MacMillan, New York, USA.

Wenger, E. 1998. Communities of Practice: Learning as a Social System. System Thinker, June 1998.

White, William. (1898) Advancing Scientific Knowledge through participatory action research. Sociological Forum, 4 (3): 367:385

Wollenberg, E; R Iwan, Godwin Limberg; Moira Moeliono; Steve Rhee and Made Sudana. (2007). Facilitating Cooperation during times   of chaos: sopntaneous orders and muddlging through in Malinau district, Indonesia. ecology and sociaety, 12 (1): 3 [online]   URL www.ecologyandsociety.org/vol12/iss1/art3

Wollenburg, et al (2001) Social Learning in Community Forest. CIFOR and East-West Center

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