



**CARIIA**  
*Collaborative Adaptation Research  
Initiative in Africa and Asia*



**ASSAR**  
*Adaptation at Scale in Semi-Arid Regions*

# Transformation in Adaptation

## *Learning from ASSAR's Regional Diagnostic Studies*

*CARIIA-ASSAR Working Paper #1*

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Titles in this series are intended to share initial findings and lessons from research and background studies commissioned by the program. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hotspots. As an interim output of the CARIAA program, they have not undergone an external review process. Opinions stated are those of the author(s) and do not necessarily reflect the policies or opinions of IDRC, DFID, or partners. Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.

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## **Acronyms**

AR5	Fifth Assessment Report for the IPCC
ASSAR	Adaptation at Scale in Semi-Arid Regions
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
COWDEP	Comprehensive Watershed Development Program
DFID	Department for International Development
DPAP	Drought Prone Area Programme
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
IWMP	Integrated Watershed Management Programme
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
NAPCC	National Action Plan on Climate Change
NWDPPRA	National Watershed Development Project for Rainfed Areas
RDS	Regional Diagnostic Studies
RWH	Rainwater Harvesting
SAPCC	State Action Plans on Climate Change
SARs	Semi-Arid Regions
VRA	Vulnerability and Risk Assessment

## About ASSAR

All authors of this working paper are team member in the ASSAR (Adaptation at Scale in Semi-Arid Regions) project, one of four hotspot research projects in CARIAA. The international and interdisciplinary ASSAR team comprises a mix of research and practitioner organisations, and includes groups with global reach as well as those deeply embedded in their communities. The ASSAR consortium is a partnership between five lead managing institutions - the University of Cape Town (South Africa), the University of East Anglia (United Kingdom), START (United States of America), Oxfam GB (United Kingdom) and the Indian Institute for Human Settlements (India) - and 12 partners - the University of Botswana, University of Namibia, Reos Partners, INTASAVE, the Red Cross/Crescent Climate Centre, University of Ghana, ICRISAT, African Wildlife Foundation, University of Addis Ababa, Watershed Organisation Trust, Indian Institute for Tropical Meteorology, and the Ashoka Trust for Ecology and the Environment.

Working in seven countries in semi-arid regions, ASSAR seeks to understand the factors that have prevented climate change adaptation from being more widespread and successful. At the same time, ASSAR is investigating the processes - particularly in governance - that can facilitate a shift from ad-hoc adaptation to large-scale adaptation. ASSAR is especially interested in understanding people's vulnerability, both in relation to climatic impacts that are becoming more severe, and to general development challenges. Through participatory work from 2014-2018, ASSAR aims to meet the needs of government and practitioner stakeholders, to help shape more effective policy frameworks, and to develop more lasting adaptation responses.

This working paper draws from ASSAR's first phase (Regional Diagnostic Study) which took stock of the current state of knowledge on the climatic and non-climatic risks in our research sites. In this paper, we focus on India to interrogate the overlaps and divergences between adaptation and development, and the actors and institutions operating in this space. [www.assaradapt.org](http://www.assaradapt.org)

### **Why focus on semi-arid regions?**

Semi-arid regions (SARs) are highly dynamic systems that experience extreme climates, adverse environmental change, and a relative paucity of natural resources. People here are further marginalised by high levels of poverty, inequality and rapidly changing socio-economic, governance and development contexts. Climate change intersects with these existing structural vulnerabilities and can potentially accentuate or shift the balance between winners and losers. Although many people in these regions already display remarkable resilience, these multiple and often interlocking pressures are expected to amplify in the coming decades. Therefore, it is essential to understand what facilitates the empowerment of people, local organisations and governments to adapt to climate change in a way that minimises vulnerability and promotes long-term resilience.

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## 1. Introduction

The potential to link transformation with adaptation has been explored by many authors, with contributions to the debate notably brought together in volume II of the fifth assessment report (AR5) of the Inter-governmental Panel on Climate Change (IPCC 2014) and in major initiatives such as the international conference ‘Transformation in a Changing Climate’ held in Oslo in 2013 (Oslo University 2013).

Through its Regional Diagnostic Studies (RDS) phase, ASSAR has assembled information on a wide range of adaptation activity in semi-arid areas across four regions – India, West Africa, Southern Africa and East Africa (Revi et al. 2015, Few et al. 2015, Spear et al. 2015, Padgham et al. 2015). It is timely therefore to review this range of activity through the lens of transformation. How do the concepts surrounding transformation relate to the mix of current and proposed activities identified as responding to social-ecological risks in these regions associated with climate and environmental change? What is driving any current transformation in the adaptation arena in these regions (recognising that climate change is just one of a likely range of possible drivers)? And what can we draom this about what it may mean for the wellbeing of different groups of people in semi-arid regions, at different spatial and temporal scales?

This paper commences with a background discussion of the terms associated with transformation, draws on this to build a conceptual framework for comparing activities, highlights a range of activities from the regions that could be classified in different ways as embodying transformation, and reflects on some of their implications and complexities.

## 2. Background to terms: what's in a word?

The IPCC definition of transformation in AR5 is 'change in the fundamental attributes of natural and human systems'. Adaptation that embodies transformation is therefore distinguished conceptually from 'incremental' approaches, in which existing practices are adjusted to make them better suited to changing conditions (Denton et al. 2014, Klein et al. 2014).

Broadly-speaking the writings on transformation in relation to climatic/environmental change tend to fall into two camps. In Klein et al. (2014), a key chapter of the IPCC AR5 on this theme, various forms of transformation are discussed. However, the chapter takes an underlying approach that sees transformation as a mechanism for managing situations of environmental or ecosystem services change that exceed the ability of vulnerable systems to manage through incremental adjustments - transformation therefore acts as 'a mechanism for managing the discontinuities associated with experiencing an adaptation limit' (Klein et al. 2014, p921). Approaches that draw from systems ecology see transformability (the ability to undergo change) as a positive characteristic of resilient systems (Folke et al. 2010). For Kates et al. (2012) transformation can entail forms of adaptation that are novel, of greatly enlarged scale and/or intensity, or that take place in different locations.

Some authors, writing from a critical social science perspective on environmental change, take their vision of transformation somewhat further than this. Pelling (2011) and O'Brien (2012), for example, interpret transformation to imply forms of societal change that challenge the structural root causes of differential vulnerability and adaptive capacity, including development pathways. This type of approach emphasizes that it is the type of society that emerges through transformation that is important and not just the survival of social-ecological systems (Tschakert et al. 2013). These variations in emphasis are reflected in the following sections, but they also have relevance for the terms 'transformational' and 'transformative'.

ASSAR explicitly uses the term 'transformative adaptation' - but what does the use of this term imply? The alternative term 'transformational adaptation' is commonly referred to by authors writing from both perspectives referred to above (e.g. Pelling 2011, Kates et al. 2012, Lawrence et al. 2013, Chung Tiam Fook 2015) and it is notable that the combination of words 'transformational' and 'adaptation' appears prominently in the proceedings of the Oslo conference (Oslo University 2013). The term transformational makes grammatic sense as an alternative form of adaptation to 'incremental' adaptation.

The combination of the words 'transformative' and 'adaptation' tends to be used less commonly - but has been selected by authors such as O'Neill and Handmer (2012) and Revi et al. (2014), writing on cities. However, there is a subtle difference between the words transformational and transformative. Some (though not all) dictionary definitions of transformative convey the word as meaning something that has the power to bring about

change. Grammatically, then, using ‘transformative’ as an adjective to ‘adaptation’ implies an adaptation activity that can change other things, as opposed to the adjective ‘transformational’ which implies an adaptation that in itself constitutes a step-change.

So, to put it simply, we have:

- ◆ *transformational adaptation = adaptation as transformation*
- ◆ *transformative adaptation = adaptation that generates transformation.*

Indeed the term ‘transformative’ was more often used this way in the various contributions to the Oslo Conference, though in conjunction with words that imply a facilitation of transformation. Hence there are repeated references to transformative processes, actions, policies, education, learning etc. (see e.g. Tanner and Bahadur 2013, Walkerden et al. 2013) aimed generally at a broad social transformation or a sustainability transformation. Note that this also seems to be how the term is employed within ‘transformative scenario planning’ (Kahane 2012). And, indeed, this is the sense in which the term ‘transformative adaptation’ is used by Revi et al. (2014), who are concerned with transforming urban lives through adaptation, and by the ideas around gender-transformative approaches to adaptation (see e.g. CARE International 2010) which see the potential to transform gender roles and relations through adaptation. For many authors it is the idea of bringing about a shift in power relations and agency that is central to the term.

Lastly we should underline that transformational adaptation and transformative adaptation are not necessarily distinct categories of action. An adaptation activity can be both transformational in character and transformative in its wider outcomes. Hence transformative adaptation as a process may have its origin in a transformational adaptation too (recognising also that the effects of an action can change over time). A key question for ASSAR is to consider whether the adaptation pathways it seeks to inform are transformational in nature, transformative in their wider impacts on wellbeing, or a combination of these two.

### 3. A conceptual framework for comparing actions

Activities that could be classed as transformational could be analysed and compared in terms of a number of dimensions, including: (i) the cause or driver of transformation; (ii) whether the process is reactive to impact or anticipatory of risk; (iii) the type of transformation they entail; and (iv) the agents of change (e.g. whether top-down or bottom-up). In a run-through of possible examples from the RDS report for East Africa, each of these dimensions of a potential typology were initially considered. However, alternative options for the second and fourth dimensions were difficult to identify in practice. Most activities were planned responses to existing risks (blurring the reactive/anticipatory distinction), and from project information alone it was not easy to definitively state if projects were purely top-down or bottom-up. Instead, the most promising and conceptually perhaps most insightful dimensions to focus on for ASSAR at this stage seem to be the cause and type of transformation.

#### 3.1 Causes/drivers of transformation

There are three categories proposed under this dimension:

- ❖ ENV = Where an action is driven primarily by environmental change; it applies to a vulnerable human system or sector, the overall functioning of which is threatened by environmental change, and can lead to a response that is reactive or anticipatory.
- ❖ SOC-ENV = Where an action is socio-environmentally driven; this means it is a response to environmental change (reactive or anticipatory) but one aimed at reducing the differential impact of environmental change on particular vulnerable social groups (according to income, livelihood, sector, gender, ethnicity etc).
- ❖ SOC = Where an action is primarily socially-driven; this refers to a change that is primarily driven by social, cultural, economic or political concerns rather than environmental pressures, but which has a secondary or incidental outcome of adaptation to environmental change.

This dimension seeks to capture what is the principal trigger for transformation. It reflects the diversity of ‘rationales’ for transformation reported by authors writing in the field (e.g. Kates et al. 2012, O’Brien 2012). However, what each of the categories has in common (and what limits their diversity) is that the driver generates a form of transformational adaptation to social-ecological risks associated with climatic change, whether as a direct or indirect outcome. Note that the first category can also include ‘forced’ consequences of environmental change, i.e. changes that actors do not deliberately choose (Folke et al. 2010).

In reality, categorisation along this dimension is seldom likely to be clear-cut. It is more like a spectrum with a range from environmental determinism to social revolution at the

extremes, and a large middle ground where there are elements of all three. However, the idea is to try to identify which is the primary type in each case considered. For example, if new agricultural programmes are considered significant enough to constitute a form of transformation, are they primarily an attempt to adapt human systems to manage the consequences of environmental change or primarily a vehicle aimed at strengthening economic livelihoods? Admittedly, in some cases this distinction may be difficult to identify.

### 3.2 Type of transformation

There are 4 categories proposed under this dimension:

- ◆ Innovation = A completely novel activity or application of an activity in a new location
- ◆ Expansion = An application of an existing activity at a much greater scale or much greater intensity
- ◆ Reorganisation = A fundamental shift in organisational structures - such as radical change to political and administrative systems, institutional architectures, economic structures, development pathways
- ◆ Reorientation = A reconfiguration of societal values, people's opportunities and social relations - such as radical change to social power relations, participation, livelihood opportunities, and value systems

This dimension seeks to capture the type of change that is described. In relation to transformation, innovation and expansion refer particularly to technological (and in some cases ecological) forms of adaptation. Reorganisation and reorientation tend to focus more on changes in social structures which might increase adaptive capacity and resilience in a more general sense, though they can still focus on specific sectors. Reorientation also connects with a growing set of ideas relating to social learning as pathways to transformation (e.g. Park et al. 2012, Chung Tiam Fook 2015).

These categories draw from the contributions of various authors noted above (e.g. Folke et al. 2010, Kates et al. 2012, O'Brien 2012, Pelling et al. 2014), though none of these authors would adhere exclusively to one category as the sole vehicle of transformation. As above the distinctions are therefore not always easy to make, although again the idea is to select the category (or if necessary categories) that most closely apply.

## 4. Classifying examples of transformation from the Regional Diagnostic Studies

In order to flesh out the typologies and understand how they can apply in practise, the ASSAR project team has reviewed the range of adaptation-related activities described for semi-arid lands in each region's Regional Diagnostic Study research. This represents a very broad spectrum of responses to environmental change across a set of landscapes considered as crucibles of biophysical and social vulnerability to climatic change. This is therefore just the type of context in which one might expect to identify different forms of transformational adaptation.

The table below lists a candidate subset of risk response approaches drawn from the RDS reports and considers how they might relate to the ideas of transformational adaptation. The table indicates how they might be classified in terms of the dimensions set out above, but it also critically considers under what conditions they could actually be described as transformational.

The final column in the table considers if and how they could also be seen as transformative: does the adaptation activity have clear potential to transform other aspects of human wellbeing? This refers to the definitional difference made above between transformational and transformative adaptation. The question is inherently difficult to answer, but some signal can be derived from the objectives of the activity and how it is framed, on the basis that an activity that has narrowly-defined objectives around adaptation to environmental change is less likely to have a wider transformative potential. However, if an adaptive change results in sufficient reduction of risk and stabilisation of income that it enables people to take greater control of their livelihood/wellbeing choices then even a tightly-focussed adaptation could ultimately be transformative in outcome.

The selection focuses on activities in specific sectors that are critical for communities' livelihoods in the semi-arid regions. As Feola (2015, p381) also notes, 'concepts of transformation draw on different system boundaries'. Hence, the selection of examples covers activities operating at different spatial scales, from a general societal level down to specific localities or sectors. Note that this is intended to be an indicative inventory. Only through detailed empirical analysis of the processes and outcomes related to each of these activities could definitive statements be made about their transformational characteristics. However, it provides an illustration of how transformation typologies could be analysed in practise, and also yields examples that reveal the importance of taking a critical stance when analysing the prospects for transformation.

Table 1. Ten possible forms of transformational change described in the RDS review

Activity	Description	Cause (& secondary category)	Type (& secondary category)	Transformational in form?	Transformative in outcome?
<b>1. Development and introduction of new crops and varieties</b>	Programmes to develop and promote new crops and varieties of crops able to manage better under low rainfall and drought conditions. E.g. new drought-tolerant maize varieties to enhance smallholder maize productivity in dryland Kenya and early maturing varieties of millet introduced to combat drought in Namibia.	ENV (Soc-Env)	INNOVATION (Expansion)	Could be seen as an adaptive adjustment to existing crops or existing farming practices and therefore incremental only (even if genetic modification is involved).	Unlikely, but possible, e.g. would need the new crop to sustain a shift in state from insecurity to security of production, livelihoods and/or subsistence.
<b>2. Introduction of novel cultivation methods</b>	Various new soil preparation and cultivation techniques introduced particularly to combat water stress, such as crop spacing methods and organic inputs in drylands of India, and conservation tillage using water harvesting furrows in Namibia.	ENV (Soc-Env)	INNOVATION (Expansion)	Novel techniques would need to demonstrate radical change in cultivation technique to be classed as transformational (i.e. something that sets them apart from incremental improvements).	Unclear, although major improvements in productivity could potentially strengthen the livelihood base of farming households (conservation tillage techniques for pearl barley in Namibia are reported to lead to several fold increases in yield over the national average).
<b>3. Rainwater harvesting for crops, livestock and domestic use</b>	Introduction and promotion of techniques across semi-arid regions to capture, store and utilise rainwater for multiple uses, including collection of rainfall from roofs for use around the home and in-field structures such as furrows, pits and sand dams for irrigation of crops from rainfall.	ENV (Soc-Env)	EXPANSION (Innovation)	Improves the ability to secure water, but essentially likely to build on existing practices e.g. for growing rainfed crops. Or is a societal shift toward greater rainwater harvesting sufficient to be classed as transformational?	Has the potential to improve health and incomes, but not clear how likely it is to generate a fundamental shift in these.
<b>4. Groundwater irrigation</b>	Utilization of technologies to draw on deep or shallow groundwater for small-scale irrigation, including subsidies for tubewell and pump irrigation in India, and communal borehole or shallow irrigation systems in Ghana.	ENV (Soc-Env)	EXPANSION (Innovation)	Yes, if the introduction or development of groundwater irrigation is novel in the context in which it occurs.	Has some potential to transform livelihoods and wellbeing, if the technology is reliable and appropriate and it is sustainably managed.

Activity	Description	Cause (& secondary category)	Type (& secondary category)	Transformational in form?	Transformative in outcome?
<b>5. Innovative approaches to climate information and forecasting</b>	Enhancement of seasonal, forecasting and early warning information to communities through tailored information products (e.g. crop calendars), new technologies (e.g. interactive mobile phone apps), and recognition of indigenous knowledge (e.g. hybrid climate knowledge systems integrating indigenous knowledge with scientific climate forecasts).	ENV (Soc-Env)	EXPANSION (Innovation)	Improvement of climate services so that they are more appropriate, useful and accessible is essentially an incremental change? The more transformational element would be recognition of the value of non-scientific forms of knowledge and their use.	Can strengthen the confidence and capacity of farmers to alter practices in response to climate variability (e.g. delay the start of the planting season, or start land preparation early in expectation for rains). By reducing risks to framing income, these newly adapted practices could in turn stimulate adoption of new livelihood activities. but unlikely to be more fundamentally transformative.
<b>6. Integrated approaches to water management</b>	Management of water resources under conditions of scarcity through river basin/watershed approaches that bring together sectors, actors and territories to undertake integrated planning for protection and multiple use of water. E.g. watershed development programmes in India and IWMP in Ghana.	SOC-ENV (Env)	REORGANISATION (Reorientation)	Could be seen as transformational if this represents a radical and successful departure from previous, narrowly-sectoral or competitive approaches to water resource access.	Has the potential to provide more equitable and sustainable water allocation, if the new approach is far-reaching in its effects.
<b>7. Integrated land management under water stress</b>	Broader land and resource management approaches designed to strengthen livelihood resilience in drylands, such as Drought Cycle Management model approach for reducing drought risk to livelihoods in Kenya, and conservation agriculture for soil management, water conservation, fuelwood supply and fire management in northern Ghana.	SOC-ENV (Env)	REORIENTATION (Reorganisation)	Could be seen as transformational if this integrated approach represents a radical and successful departure from previous, narrower approaches to resource management.	Would require the broad approach to understanding risks and resource management to place livelihoods and decision-making of the poor into a fundamentally more secure or empowered position.
<b>8. Women's livelihood/credit and mainstreaming initiatives</b>	A range of activities across the regions designed to strengthen women's livelihoods and decision-making roles in resource management, including livelihood cooperatives, credit associations and water user associations (e.g. involvement of women's cooperatives in income diversification activities in southern Mali)	SOC (Soc-Env)	REORIENTATION	Can be transformational if it entails a new shift in focus that recognises and builds on the differential needs and capacities of women.	Has the potential to be transformative if it brings about a major change in the ability of women to take decisions and action to strengthen their livelihood security and manage resources.



Activity	Description	Cause (& secondary category)	Type (& secondary category)	Transformational in form?	Transformative in outcome?
<b>9. Livelihood diversification</b>	Support for livelihood diversification, in many cases focussed on alternative livelihoods for pastoralists, includes capacity-building inputs to production and development of markets. Diversification also occurs autonomously, such as adoption of new crops and charcoal production in West and East Africa.	SOC (Soc-Env)	REORIENTATION (Expansion)	Transformational in the sense of bringing about an underlying change in forms of livelihood.	Could be transformative if it brings about a fundamental change in income security and other aspects of wellbeing.
<b>10. Resettlement of pastoralists</b>	Strategies and interventions normally pursued at government level to resettle groups classed as at high risk. Includes the villagization process aimed at creating permanent rural settlements for pastoralists in Ethiopia, in which alternative livelihoods such as irrigated farming are promoted.	SOC (Soc-Env)	REORGANISATION	Inherently transformational in that they represent a fundamental shift in the settlement place, pattern and lifestyles of the target population.	It is argued that resettlement can provide a chance to transform lives through alternative livelihood opportunities and access to health and education services. However, improved livelihood security and wellbeing may not be the outcome.

## 5. Critical themes

The range of activities noted in Table 1 includes a number of examples that illustrate the complexities at work in adaptation, especially its differentiated implications (socially, spatially and temporally). They also illustrate some of the conditions that shape how and if transformation proceeds.

### 5.1 Recognising adverse consequences, maladaptation and trade-offs

The term transformation generally has a positive connotation, but in almost all cases the ‘warmth’ of this term masks a critical issue that the types of fundamental change that it embodies is likely to have complex and multi-faceted implications. There is perhaps a need also to acknowledge that transformations are not always desired or intended. Walker and Meyers (2014), for example, refer to forced threshold shifts to ‘undesirable’ ecological states. Moreover, even actions that have an evident adaptive value for certain stakeholders can have negative consequences for other social groups or sectors, now or in future. This could be articulated as maladaptive transformation. However, that term itself is perhaps as simplistically negative as its counterpart is positive (in that few actions are purely negative just as few actions are purely positive). An alternative is to view the implications of transformation in terms of weighing up different trade-offs. A useful concept here is that of social-ecological trade-offs, as applied by Sikor (2013) in relation to ecosystem services.

What all this underlines once again is that even if an adaptive response can be described as transformational in type (and arguably not all those in the Table can be described as such) it may be difficult to justify describing it as transformative in outcome – in terms of challenging and changing patterns of vulnerability, inequity and unsustainability.

#### Equity issues - access to adaptation

A consistent theme that arises across the RDS reports (and that is indeed a core dimension of interest in ASSAR) is the issue of how equitably adaptation opportunities can be applied, especially in conditions of widespread but varying levels of poverty. Related to this, there is the question of whether uneven access to adaptation exacerbates existing inequity.

- ◆ In southern Africa, for example, conservation tillage has been shown to improve yields, but a ripper is needed for tilling and this is not accessible to many farmers due to financial limitations. Similarly, drip irrigation and rainwater harvesting require investments. If farmers are acting alone or without assistance, any implementation of these measures is therefore more likely to be made by farmers who already have more capital and access to equipment. This means that any transformation is unlikely to be widespread without careful consideration of the barriers to most people being able to adopt the approach.

- ❖ Evidence from West Africa illustrates that crop genetic improvement has cost implications for poor farmers and women farmers who lack credit to be able to adopt these strategies (Dieye and Roy 2012; Tambo and Abdoulaye 2012). Even though potentials for sustained and increased yields are high, the high micro-variability in biophysical characteristics of the West African agricultural landscape also limits the wholesale introduction of genetically improved crops across wide geographical scales (Padgham et al. 2015).
- ❖ Diversification of crops may be difficult for farmers who have low financial and technological capacity, as factors such as access to roads, markets, and credit can either catalyze or constrain actions to manage risks. In Senegal, critical factors identified included improved infrastructure for seed, fertilizer and pesticide distribution, irrigation, functional credit and insurance institutions and market access (Dieye and Roy 2012; Mertz et al. 2011). Similarly, the lack of a secured land tenure hinders the drive for diversification as there is a high level of uncertainty associated with the duration of land available to the farmer. In northern Nigeria, the adoption of drought tolerant maize varieties is constrained by the inability of farmers to afford seed and complementary inputs to make use of drought tolerant varieties feasible (Tambo and Abdoulaye 2012). Similar findings have emerged on promotion of drought-tolerant crops in parts of East Africa, in which higher production costs and other factors have reinforced existing livelihood inequities (Eriksen et al. 2005). It is also important to build trust (of farmers) in promoting a shift to new varieties, partly through demonstration plots, but also through facilitating a relationship of trust between farmer and supplier. Lack of extension services continues to hinder the efforts to shift from climate sensitive crops in northern Nigeria and southern Mali (Ebi et al. 2011).
- ❖ Though the potential for mobile phone systems to aid with climate risk communication has often been stressed as useful, illiteracy and cost implications for the farmer who cannot send text messages, afford phones and pay for the text messages can limit access to seasonal weather and climate information (Padgham et al. 2015).
- ❖ Small reservoirs and irrigation also have major cost implications for poor farmers (Nation 2010). Households with land tenure insecurity (including in some cases female-headed households facing barriers to land ownership) may not be able to access irrigation technologies, while lack of access to information and limited institutional support and capacity further impede uptake of adaptation measures. In the long term, maintenance costs and availability of expertise may present challenges to sustained adaptation (Lagger 2011).
- ❖ In the case of wider scale and communal water management, there may be questions to ask around the equity of outcomes. In India, even though the activities

of watershed development programmes contributed to the augmentation of local natural resources, there were issues of inequalities in the distribution of benefits. Kerr (2002) found that satisfaction with watershed projects was positively correlated to land holding size, and many landless people strongly resent their loss of access to common lands. This was more so in the case of women and livestock herders who indicated suffering due to loss of access to common lands sealed off to promote regeneration. Turton et al. (1998) indicated that as the common property resources regime matures, the increased value of the resource frequently attracts local commercial and political interests which also rarely benefit the poor.

### **Impacts on livelihoods generally**

Risk response/adaptation activities can provide livelihood benefits in some respects but also bring direct or indirect negative impacts in other respects - again bringing into question the value or the depth of transformation. Such trade-offs are common in approaches that have a broader social rationale.

- ◆ In India, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) social protection scheme, which provides 100 days of guaranteed wage employment in a financial year to every rural household whose adult members volunteer to do unskilled manual work, provides benefits in terms of reducing the push for migration. The study by Kareemulla et al. (2013) indicated that the seasonal migration of rural labour has come down significantly due to the opportunities of employment provided under the scheme. At the same time, there have been reports and studies where MGNREGA was blamed by the farming community for abnormal rise in wage rates and non-availability of labour across sectors. A Federation of Indian Chambers of Commerce and Industry (FICCI)-KMPG report indicated that MGNREGA affected farm labour adversely and could have a negative impact on productivity and prices (Basu, 2015). It is also plagued by corruption, administrative hurdles (such as inadequate staff, delayed payments) and limited scope for taking up innovative activities.
- ◆ Negative repercussions for livelihoods can also emerge in a direct sense from adaptation activities that bring mixed value. A drought resistant millet variety that has been introduced to Namibia is not without its problems. Communities complain that it is too short and rots if it stands in water during a flood, also that the stalks are not as strong and suitable to use as building materials (Spear et al. 2015).
- ◆ In India's watershed development programmes, lack of regulation of groundwater management also led to unequal use of recharged water affecting collective action to sustain and maintain watershed structures. The de facto situation is that the individual who owns a given piece of land has the right to appropriate surface water and groundwater. In the watershed framework, the community conserves the rainwater and recharges the groundwater using check-dams and other recharge

facilities. However, in the absence of appropriate regulatory mechanisms and institutional arrangements for distribution of benefits across households including the landless, the private landowners tend to capture the irrigation benefits from increased availability of groundwater (Joshi et al. 2004). In this context, Sangameswaran (2006), raises the broader question of whether public resources (such as state funds for watershed development) should be used for development of a private resource (such as groundwater) without making any attempt to change the structure of rights over groundwater, especially when access to water is important not just for improved livelihoods but also for greater social and political power.

- ◆ In Ethiopia, villagisation policies designed to develop more permanent settlements and lifestyles in pastoralist areas have long attracted criticism, in part because of claims around coercion and social/political control, but also for their mixed impacts on livelihoods and wellbeing (Lorgen 2000). Resettlement has been promoted as a means to reduce exposure of pastoralists to the impacts of climatic risk, as well as bring people within reach of service networks. However, commentators have described a history of negative consequences, including social separation, cultural erosion and breakdown of social networks, issues of reduced access to natural resources in resettlement sites, and productivity problems associated with the transition to agro-pastoralism that villagisation generally entails (Pankhurst 1992; Lorgen 2000). One result has been an entrenched and polarised set of contrasting viewpoints on the social impacts of villagisation between commentators and government sources (Cochrane and Skjerdal 2015).

### **Exposure to other risks**

Adaptive measures may be effective in reducing exposure or susceptibility to one type of risk, but their overall efficacy and ‘transformability’ may be undermined if their adoption increases vulnerability to other forms of risk.

- ◆ In southern Africa, during drought conditions, governments have made provisions to offer transport to take livestock to alternative grazing areas. Moving livestock to other areas may keep the livestock alive but will most likely lead to further environmental degradation and possible vulnerability to loss of livestock later by drought (Muhangi 2008; Newsham and Thomas 2009).
- ◆ While livelihood diversifications may achieve short term stability in farmers’ income, they can lead to other adverse consequences such as competition for water resources in the case of irrigated vegetable production and potential conflicts in the long run. Similarly, the intensive production of charcoal in northern Ghana as an alternate livelihood may lead to deforestation if not regulated (Kalame et al 2008).
- ◆ Water management structures can run the risk of expanding micro-habitats for certain water-related pathogens and their vectors. According to Boelee et al. (2013),

promotion of rainwater harvesting and water storage structures around homes can create new open water surfaces and lead to increased transmission of water-related diseases.

## Timescales

Processes of change cannot be presumed to be unidirectional. A transformational change that appears to impose short-term costs could become positively transformative in future as conditions and contexts change. But the reverse could also potentially apply: what might bring a seemingly transformative benefit now may not be so benign at a later time. What was positive at a certain period could end up being maladaptive over a period of time if there is no recognition of potential negative externalities and forward-looking planning. One case from India illustrates how a transformational change (not initiated as an adaptation per se), became both positive and negative in effect at different points of time.

- ◆ In India, pump irrigation evolved in the late 1970s and since then has been the driving force behind national growth in food and agricultural economy. The triggers for the growth in pump irrigation were the technological developments and enabling environment for making it accessible. During the early period of the technology, government interventions such as targeted subsidy on pump capital, public tube well programmes, electricity subsidies and a flat tariff all propelled the green revolution. This transformation of agriculture led to around two-fifths of India's agricultural output to be contributed from areas irrigated by groundwater (Mall et al. 2006). However, the current status of groundwater has become precarious. Groundwater depletion has become a serious issue, especially in the arid and hard rock aquifers. This has also exacerbated a growing concentration of fluoride and other salts in groundwater. A potential maladaptive strategy at the individual scale is indiscriminate use of groundwater for irrigation, which is driving resource scarcity, pushing up agriculture input costs, locking people into an energy-intensive, diesel-dependent pathway, thus becoming unsustainable in the long run (Shah 2009). There are intermittent attempts by the central and state governments to address the issue, but most lack the political will to enforce the policies. For example, the Maharashtra Groundwater Development and Management Bill of 2009 requires registration of owners of tubewells, prohibition of drilling deep-wells, restrictions on withdrawal of water from existing deep-wells and provision for levy of excess, registration of drilling contractors and prior permission before drilling a tube well. However, implementation of these measures is expected to be a challenge. The story of groundwater use followed both a rapid positive and negative development pathway. What was considered as a positive adaptation at a certain point of time has become a maladaptation in the course of about four decades.

## 5.2 Understanding the governance pre-conditions for transformation

It is also important to try to understand the conditions that act as barriers or alternatively are supportive to transformational adaptation. Kates et al. (2012, p7159) discuss certain conditions that set the stage for transformational adaptation, including biophysical drivers such as extreme events, but also supportive socio-political environments, which: ‘include effective adaptive institutions combined with public values and attitudes and the availability of understandable and socially acceptable options, along with incentives and resources for action and leadership’. Here we look at some institutional aspects of enablers and barriers highlighted in the RDS work across the regions, topics that centre around the governance of adaptation.

### Enabling factors

Enabling factors related to governance apply at multiple scales. At the national level it may for example entail a strategic policy shift to recognize, accommodate and mainstream climate risk concerns. At subnational and local scales it may be a case of building an enabling environment through capacity development and in some cases decentralisation of decision-making powers.

- ❖ At national level in India, for example, formation of a National Action Plan on Climate Change (NAPCC) is an important development in the climate change context, arguably setting pre-conditions for a transformation in adaptive governance structures (although see below under barriers). The operationalization of the plan is still underway. Since 2010, the central government has requested states to develop State Action Plans on Climate Change (SAPCC), which aim to achieve coherence across states in design and implementation of climate measures, as well as recognise the state jurisdiction over several areas within the NAPCC, particularly those related to adaptation (Dubash 2013).
- ❖ The evolution of watershed development programmes in India also illustrates how multi-scale support can initiate significant change. There have been many national initiatives supporting the watershed development approach such as participatory watershed management through the Drought Prone Area Programme (DPAP), the Integrated Watershed Management Programme (IWMP), and the National Watershed Development Project for Rainfed Areas (NWDPA). Watershed development programmes have also been undertaken extensively at state level (e.g. the Comprehensive Watershed Development Program (COWDEP) and Jal Sandharan in Maharashtra) and through many bilateral and multi-lateral donor supported watershed programmes. The watershed development programmes started as mainly technological interventions for in situ soil and water conservation. Over time, the guidelines for watershed development were revised from time to time to include social aspects such as social mobilization, multi-stakeholder approach and

employment generation activities. But from the point of view of climate change and adaptation, watersheds development inherently helps in drought proofing through water and soil conservation measures and thereby reduces risks.

- ❖ Regulatory regimes may also have a role to play as enabling mechanisms. For example, the Bangalore Water Supply and Sewerage Act (2009) made rainwater-harvesting (RWH) mandatory in the Bangalore agglomeration. However, regulatory approaches alone are unlikely to be sufficient to enable effective change of behaviour. When Umamani and Manasi (2013) explored the adoption and implementation of rain water harvesting in Bangalore, the results indicated that 94 per cent of the households adopted RWH out of compulsion, and 81% did not follow proper technical procedures. It was found that awareness levels regarding cost aspects were poor leading to exploitation by plumbers and that there was need for more people-friendly support services.
- ❖ Potential governance-related enabling mechanisms are not confined to formal government structures. In Kenya, a number of initiatives have sought ways to strengthen customary rangeland governance as a means to transform adaptive capacity. In Isiolo County, the Resource Advocacy Programme has been working with support of international agencies to design and pilot an approach to decentralised planning that seeks ways to address rangeland governance and livestock mobility issues (Hess and Pattison 2013). Alongside efforts to build local capacity for natural resource management and planning, developing natural resource maps and legitimizing traditional Boran pastoralists rangeland management by establishing local bylaws, the approach has piloted a Climate Adaptation Fund with funding from DFID to be locally managed by communities in partnership with county government (Roba 2014).

### **Barriers to change**

Just as governance dimensions can enable, so the other side of the coin is that they can constitute barriers to adaptation and transformation in relation to political will, institutional capacities, and inertia in modes of operation.

- ❖ In West Africa, for example, the roles and influence of different actors such as governments, local authorities, local communities and donors militates against successful adaptation planning. Factors such as uncoordinated institutional arrangements for climate-water dialogue continue to hinder information generation across the various stakeholder groups leading to weak information access, flow and sharing for transformation efforts (Schiffer et al 2008). The institutional mandate and governance system for private sector involvement in irrigation is also unclear (MoFA 2007). Within coastal West Africa, the lack of an urban focus is an important gap (Padgham et al 2015).



- ❖ In India, the progress of the mainstreaming of climate risks under the NAPCC appears to be hampered particularly by institutional capacity issues at subnational scales. Out of 29 Indian states, 22 have submitted their SAPCC to the Ministry of Environment and Forests. Of these, 19 have been endorsed by the National Steering Committee. There are still states that are yet to develop SAPCC (for example, Maharashtra) which reflects a certain sense of inertia and lack of urgency. Therefore, even though at policy level the NAPCC is a major shift and is a step towards transformation, only when the action plan gets integrated into the state and local governance mechanisms, could it truly be called transformational. The prevailing conditions in the governance environment could act as barriers for operationalizing the policies. These include poor capacities of the personnel at different levels of governance to understand climate change and adaptation, resistance to change, lack of clarity on budgetary allocations, and lack of clarity on roles and responsibilities. For example, in the case of watershed development, revised watershed guidelines proposed a change towards greater participation mainly through new procedures and some changes to formal structural arrangements. But it was found that the bureaucracy typically prefers strict rules to flexible processes and that old procedures and structures which acted as disincentives or barriers to new ways of working were not eliminated (Pasteur 2002). Therefore, one can consider the change in policies as only the beginning of reorientation and restructuring process that could eventually lead to transformational adaptation.
- ❖ In Namibia, the governance focus on emergency response may be acting as a barrier, in part by eroding innovation capacities. In general, the government of Namibia focuses more on responding to drought by providing emergency relief (e.g. see the Drought Relief Response Plan (GRN 2013)), whereas more innovative approaches such as drip irrigation, water harvesting and conservation tillage that are more geared towards adaptation are driven by projects funded by international funders and implemented by non-governmental bodies (Spear et al. 2015). The provision of emergency relief during drought periods in Namibia may be making communities dependent on the government for assistance and dis-incentivising people from being innovative and changing their own practices to secure their own food security and livelihoods (MET 2011).
- ❖ Transformational approaches will often entail forms of change that are likely to be contested by some actors and require active dialogue between interest groups if they are to proceed. Creating spaces for multi-stakeholder dialogues can facilitate opportunities for collaboration and enable cross-scalar adaptation (for example linking communities to local and district authorities and higher levels of governance through processes such as Vulnerability and Risk Assessment (VRA) applied by ASSAR in Botswana and Namibia). However, multi-stakeholder activities for facilitating dialogue around transformation have to recognise and work with the

institutional barriers to participation that commonly exist, in part by recognising the limitations of one-off events, however genuine the spirit of collaboration may seem at the time of the event. Dialogue has to be a continuing process if it is to maintain the momentum and trust of people and organisations engaged in effecting the change (Kahane 2012).

## 6. Conclusion

Based on an attempt to categorise the different meanings and forms of action ascribed in the adaptation literature to the terms surrounding transformation, this discussion paper considers a range of responses to climate-related social-ecological risks drawn from four regional review studies (RDS reports for India, East Africa, West Africa and southern Africa). These responses not only differ in sector and scale, but they also can be seen to reflect different drivers and to constitute different functional types of change.

The drivers that trigger or motivate change may be predominantly environmental or social pressures, or a combination of the two in terms of socially differentiated or concentrated risks. We can see this complexity operating concurrently. For example, within the West African drylands the various groups facing the need for transformation in the case of climate vulnerability are largely the agrarian rural population and their livelihood systems which continue to be significantly reliant on the rains. People in the Kouchiala district of southern Mali linked changes in agricultural outputs to climate change and variability. But working alongside climatic drivers are a range of social and environmental drivers including degradation of agro-ecological systems, large-scale land-use developments, changing entitlement to land and the erosion of traditional land tenure arrangements, and the rising toll of conflict in rural areas (Demont and Rizzotto 2012; Marchetta 2011; Roncoli et al 2008; Shapland et al 2013). Also the motivational trigger for changes such as migration or livelihood diversification may be less directly about risk and more directly about labour or market opportunity. This ambiguity of motivation between push and pull factors for adaptation and/or transformation may be applicable at all scales.

Looking across the series of responses considered in Table 1, there does appear to be a tendency for initiatives driven primarily by environmental pressures to induce innovation and expansion as types of change, while more socially driven actions to be associated with reorganisation and reorientation of social structures, norms and behaviours. This rough split broadly coincides with the different ways transformation is viewed in the science and social science literatures (see below). Establishing quite which of these responses can be described as transformational in form and potentially transformative in outcome becomes a difficult task, especially so if we consider the range of caveats (adverse consequences and trade-offs) and operation of barriers and enablers that are discussed in section 5. Given the interpretative nature of such analysis, it could be conceded that definitive ascriptions of transformation are indeed impossible to claim.

The variation described above neatly illustrates how difficult it is to lay down specific rules about what constitutes 'transformation' in adaptation. The underlying question of what depth of change is required for it to be described as 'transformation' remains a contentious issue. Feola (2015, p387) is understandably critical of the use of the term in situations where the depth of change is not so significant, stating: 'There is a need to resist the fashion of transformation, i.e., the temptation of attributing a transformative character to any

instance of social change'. But there are also clear differences between those writing in relation to social change that challenges inequity and injustice and those viewing transformational adaptation to refer to something more narrowly focussing on systemic response to climate and/or sustainability issues (e.g. Kates et al 2012).

As the research of ASSAR progresses it will be key for the research teams to revisit these questions and dimensions and continue to critically interrogate what we mean by the terms 'transformational' and 'transformative'. But there are key questions we can also pose around actions that are perceived by others as constituting transformation. We can examine what transformation implies at different scales, questioning for example whether large-scale/top-down transformations of economic and regulatory systems may have maladaptive consequences at finer scales. We can look critically at the discourse of transformation, considering how different groups and actors are conceptualising and describing the transformation. We can study the power relations of transformational change, asking who is responsible, why is it happening, and how can it be influenced, encouraged or impeded. All these questions will be important when thinking through adaptation scenarios and their transformative potential.

Feola (2015) makes a distinction between research contributions that are 'descriptive-analytical' and 'solution oriented' in their approach to transformation. In his terms this output is squarely one of the former (ie in the more typical realm of academic work), though it does lay out a grounding on which to reflect on more applied objectives of the project. Ongoing research within ASSAR will be examining how and why adaptation activities proceed on the ground in the case study areas, deepening this analysis of actions that have potential to constitute transformation. But, as ASSAR moves into its more forward-looking scenario planning work, research outputs, though they may stop short of providing solutions per se, will become steadily more solution-oriented. In this task, they may be guided by a growing body of work on enabling widespread stakeholder input into decision processes around transformation (see e.g. Apgar et al. 2015; Goldstein et al. 2015).

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