

What can business contribute to adaptive water management? - Environmental change as driver for sustainable business behaviour

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Abstract

Business is often viewed as a main culprit for environmental deterioration and thus as a major cause for environmental change, due to pollution impacts or the over-abstraction and exploitation of environmental resources in response to short-termed profit-maximizing interests.

At the same time, business is increasingly affected by environmental change as well and thus faced with the need to develop strategies to cope and adapt. A much quoted example in this regard is the increasing scarcity of production-relevant resources, such as water in case of the food and beverage industries.

This not only highlights the dependence of economic viability and stability on sound and resilient ecosystems, but also gives rise to the question of how the potentially growing awareness of business’ vulnerability to environmental change can be used in order to change corporate motivational patterns, leading to more responsible and sustainable business practices.

This question is of particular interest in countries with weak regulatory capacities, as government might not be in a position to provide sufficient regulatory incentives. Evidence from South African business sectors indicates that firms’ self motivation to engage in sustainable practices can be leveraged and modulated by governmental as well as other actors through engaging governance modes to yield sustainable outcomes. The results however also convey necessary conditions in terms of government will and capacity, particularly with regards to skills required for engaging a broad range of societal actors. The degree to which business behaviour can be transformed crucially depends on these factors particularly at the local governance level.

Introduction

The relationship between business and climate change is subject to an increasingly intensive discussion in the environmental community, the business world itself and also finds growing reflection in the academic literature.

Business is without doubt an important factor when it comes to approaching the phenomenon of climate change. Business is often considered as the main culprit for environmental degradation and thus also climate change, mostly due to climate relevant emissions from production processes (WBCSD, 2009).

While this has led to wide-spread criticism of business practices, there is also a growing awareness that without a contribution and thus a fundamental change of the business community it will not be possible to address the challenges emerging in the context of climate change. There is a need to carefully analyze the role that business can play in this regard and what motivations might apply in driving business behaviour. This is also supported by analyses conducted by (Van Zeijl-Rozema, Cörvers, Kemp, & Martens, 2008) on the mode of governance for sustainable development, which is described as complex but also as necessarily inclusive of all potentially relevant actors, as states alone might not be in a position to address these paramount challenges. According to Liu et al. (2007) climate change epitomizes the complex, non-linear interactions between social and natural systems and is a suitable example for the type of “wicked problem” to be addressed by sustainable development.

If we look to the current academic literature addressing the role of business vis-à-vis climate change, much focus is placed on strategic orientation at the firm level, with a strong emphasis on the mitigation of climate-relevant emissions as well as those changes necessary within a business organization to cope with potential impacts of climate change on operations (Linnenluecke & Griffiths, 2010; Pinkse & Kolk, 2010; Winn, Kirchgeorg, Griffiths, Linnenluecke, & Günther, 2010). Climate change in these cases is often framed as a strategic risk for businesses, and proposed solutions are based on derivatives of business strategies, which are adapted to the climate change challenges. These are for the most part directed at rendering a more resilient business and thus sustainable income base for the firm as a strategic entity.

This paper aims to take a slightly different perspective by focussing on the aspect of adaptation to climate-induced environmental changes. Consequently, it is based on the premise that environmental change affects business and the surrounding communities alike, thus placing a much stronger emphasis on the interaction between these two groups. It thus covers, firm-internal adaptation measures, as well as those measures that originate from companies but have strong external implications alike, thus covering aspects of internal measures and external measures, which involve interaction with surrounding communities and are targeted at improving overall adaptive

capacity. In this regard these measures transcend the immediate sphere of influence of the firm and contribute to overall climate change governance (Hamann, 2010).

In a second step, the paper asks for potential drivers that motivate businesses to embark on a certain strategies. It is expected that these derive from a combination of resource-oriented drivers, i.e. firm-internal factors, such as an increased awareness of business vulnerability to climate change and institutional drivers, such as regulatory incentives and other drivers, provided by among other government actors. In this regard, specific attention will be paid to the capacity of government and the specific implications of varying capacity for firm behaviour.

In combining these two aspects, the paper aims to merge the current debate on corporate responsibility with considerations with view to climate change governance. This is reflecting currently emerging developments at the policy level (WBCSD & IUCN, 2010).

Methodology and Approach

In the following sections, I first derive necessary conditions for climate change adaptations using the example of sustainable water management as a proxy and develop potential business strategies and responses in this regard. In addition, potential drivers for conducive business behaviour in this regard are discussed. These initial assumptions are then applied to an indicative case study in order to refine and verify the initial model and assumptions. The methodological approach is guided by concepts developed by Eisenhardt (1989) and George et al. (2005). These propose the use of case study research in order to iteratively arrive at a more comprehensive and accurate picture of the interactions and relationships proposed by existing literature. The South African mining industry serves as a case in point for testing some of the initial assumptions with regard to the contribution of business to climate change adaptation. In the last section of the paper preliminary findings are used to derive policy recommendations for decision-makers and the identification of potential further research activities.

Adaptation to climate change through sustainable water management

Adaptation measures can involve a whole range of activities, depending on the climate change impacts incurred. In order to focus the analysis of this paper, specific focus will be placed on climate change impact on water management.

There is abundant evidence that water resources will be significantly impacted by climate change with wide ranging-further impacts on ecosystems as well as human lives (Bates, Z.W. Kundzewicz, S. Wu, & J.P. Palutikof, 2008). Furthermore, seen globally, expected impacts, such as increased precipitation on the one hand and droughts on the other, are expected to vary substantially spatially as well as in their intensity. For example, semi-arid areas will experience a further decrease of water

resources, while other regions are exposed to a higher likelihood of flooding due to increased precipitation intensity.

In addition to these immediate impacts on water resources, further impacts are to be expected for food security, the operation of water-related infrastructure and thus on other related policy areas, such as land management, health and nature conservation. Water is a crucial element in all these policy areas and thus serves as a useful proxy for considering climate change adaptation policies (Kranz, 2010).

Sustainable water management as a way to address climate change impacts on water resources thus provides for a commendable approach to investigate potential contributions of business to address these challenges.

The set of requirements for sustainable water governance used as a point of reference for the ensuing analysis is based on the assumption that the characteristics of the resource water necessitate a specific rule system, which has been described by Ostrom (1990) in her work on the appropriation and provision of common property resources. Based on these observations, a set of normative requirements can be derived that would provide for the sustainable governance of such complex systems as water (Dietz, Ostrom, & Stern, 2003). While these requirements are presented as distinct factors, there are clearly numerous interdependencies and relationships between several of these aspects. These are however omitted at this point for analytical clarity.

First, the provision of sound, trustworthy *information* is considered key in making decisions about complex environmental systems. In addition, such data would need to be congruent with the scale of the problem addressed (Young, 2002) and secondly cater to the needs of the decision-makers. In accounting for the uncertainties inherent to the management of natural systems, the information provided needs to give an estimation of the uncertainties involved as well as allow for the assessment of trade-offs encountered across multiple scales.

Secondly, with the management of natural resources always bearing the potential for conflict among different stakeholders, adaptive governance systems must be geared to avoid and address potential or actual conflicts, through establishing mechanisms allowing for these parties to *participate in decision-making*, thus creating arenas for learning and change (Pahl-Wostl, 2008). This is also confirmed by the view on water governance suggested by Turton et al. (2007), which proposes a triad model in order to capture the interfaces between different actor groups pertinent for adaptive water management. They argue that government, society and science need to engage in a mutual dialogue in order to facilitate a transition to more adaptive water management. Turton et al. (2007) describe the relationship between government and society as 'an unwritten, hydro-social

contract, incorporating the norms and values of society that structure the relationships between key stakeholders. They point to the interfaces between these different actors as important loci where dialogue and learning take place and where common values are developed, which then in turn affect the resilience and robustness of the water system under management. Providing access to water planning and management to a wide range of stakeholders is considered fundamental in this regard, while specific attention needs to be given to those with limited capacities to participate¹.

As indicated before, *infrastructure* constitutes a further key component with regards to the management of water resources. According to Dietz et al. (2003) the role of infrastructure can be conceptualized in two ways. On the one hand infrastructure supports the exploitation of the resources and thus the use of infrastructure needs to be subject to careful planning. On the other hand, infrastructure has a more positive connotation in that it can contribute to protecting natural resources, help provide equitable access to natural resources use, enable the monitoring of human impact on the resources and assist with the generation of information for planning purposes.

Finally, the authors advocate certain *preparedness for change* of the institutions established for managing the resource. This concept draws on some of the previous factors and represents the principal lesson of adaptive management research (Gunderson & Holling, 2001). More recently, in the face of global environmental change, research has addressed the necessity to cope with occurring and future changes and uncertainties. This capacity to adapt is considered a key component of sustainable water management systems (Global Water Partnership - TAC, 2004).

The Global Water Partnership, an international network of experts in the field of water management, furthermore promotes *integration* as one of the key attributes of water governance systems (Global Water Partnership - TAC, 2004). Integration would include the linkages between macro-economic policies and water development, management and use, the integration across different sectors (e.g. industry, agriculture, and households) as well as the integration of decisions made at the local and river basin level with broader national objectives. Integration as guiding management paradigm for achieving sustainable water management is referred to as integrated water resources management (IWRM) and is broadly defined as 'coordinated development and management of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (Global Water Partnership -

¹ The aspect that emerges strongest in both cases, is that of learning, or rather social learning in the context of reflexive governance, which is achieved through the dialogue and interaction of all stakeholders involved (Pahl-Wostl, 2008; Turton et al., 2007). It is argued that learning will allow for co-evolution, adaptation and eventually sustainable development.

TAC, 2000)². Following work by Holling (1978), Pahl-Wostl and Sendzimir (2005) suggest the concept of adaptive management as central management style to realize effective IWRM processes.

Although ill-defined to some degree, it could be argued that adaptive and integrated management systems serve as core frames of reference for sustainable water management. In addition, this key management paradigm is augmented by a number of workable management principles.

The precautionary principle refers to careful *planning* and the use of scenarios in selecting water management measures. Measures should be chosen according to the no-regret-principle and in the best case be reversible (O'Riordan & Cameron, 1994), thus supporting the requirement of preparedness and adaptive management.

The polluter-pays-principle points to the *responsibility* of those causing the pollution or deterioration of water resources for mitigating these impacts retroactively, whether through undertaking the clean-up or providing financial means for others to perform this task (Rogers, De Silva, & Bhatia, 2002).

The principles of source reductions and resource minimization in the first instance address the limitation potential pollution sources, for example through redesigning production processes or installing end-of-pipe clean-up mechanisms. Secondly, the principle advocates the reduction of the resources used, for example through increased efficiency of production processes (Molden, 2006; Umweltbundesamt, 2001). These principles also speak to the IWRM components of water resources assessment and careful planning for IWRM as well as efficiency in water use.

In reviewing the characteristics and requirements for sustainable water management outlined above, the overall governance style, echoing the observations by (Dietz et al., 2003), should be predictable, open and enlightened in terms of a clear vision about water management. At the same time, this requires a professional bureaucracy with regards to sufficient human and financial resources, infrastructure and available knowledge, the ability to form partnerships and allow for broad-based civil society participation. The latter aspect points to the relevance of an *appropriate institutional framework*, which is vested with these characteristics and in a position to fulfill these tasks. Ostrom (1990) proposes a set of institutional design principles for addressing local common pool resource problems, which also provide for some guidance for water management institutions at other scale

² In 2002, at the World Summit on Sustainable development in Johannesburg, the goal was established for all countries to develop integrated water resources management plans by 2005, which has even more contributed to the manifestation of the concept (Bullock, Cosgrove, Van der Hoek, & Winpenny, 2009).

levels³. Still, the focus for this thesis is placed on the *capacity* necessary for (government) institutions to perform the required tasks and thus provide for an enabling environment for other actors to become involved in sustainable water management (GWP, 2008).

[While successful strategies and set-ups are bound to follow the same pattern and logic (Dietz et al., 2003), the actual type of the institutional set-up will eventually vary with the specific water management situation as well as other factors deriving from politics, culture in a country or region. A further differentiation needs to be introduced between institutions at the national, basin and local level (Pegram, Orr, & Williams, 2009a).]

These attributes and requirements of sustainable water governance serve as a basis for identifying and evaluating business strategies and activities with view to their potential to assist in addressing key water management challenges. The following sections focus on these contributions and - in a second step - investigate motivations and key drivers defining corporate strategies.

Role of business

The contribution to business actor to sustainable water management as delineated by the factors outlined above is to a large determined by corporate strategic options (and eventually choices), which can either take place within the firm's boundary or beyond, i.e. along the value chain and or in interaction with other stakeholders (Hoffman, 2000).

Examples for activities, which mainly take place within the firm's boundaries are water efficiencies improvements and technological innovations which help to achieve these or help in improving the quality of sewage released into the environment. Through these measures, firms cater to the principle of resource reductions and source minimizations and thus relieve the overall pressure on the water ecosystem in terms of water abstractions and/or quality implications (Hoffman, 2000). Firms can also engage in establishing similar approaches with supplier or other parts of their supply chain.

Internal monitoring and water resources planning also support the careful use of the resources. Monitoring is furthermore an important means to ensure overall compliance with existing legislation. In cases, where monitoring data and water plans, which apply to the watershed level are shared with surrounding communities, discussed with other stakeholders, these constitute an important contribution to the water resources governance in that particular region (Dietz et al., 2003). Planning

³ In addition to a clear definition of boundaries, i.e. those responsible for and those affected by resource management decisions, Ostrom (2005) highlights the necessity of setting-up mechanisms allowing for collective action and establishing clear rules for the allocation of benefits and costs. Structuring resource management institutions as nested enterprises of multi-level and polycentric systems is considered a prerequisite for dynamic and adaptive resource management arrangements.

also cater to the precautionary principle and thus aids in improving the preparedness to changes in water availability as well as other climate-change induced impacts.

Further potential contributions of private actors derive from their involvement with water infrastructure planning, development and financing. In cases where firm become involved with developing water infrastructure, which not only benefits their own operations, but also helps meet community needs, this can be considered a contribution (Addams, Boccaletti, Kerlin, & Stuchtey, 2009; Pegram & Schreiner, 2009b). Related contributions pertain to capacity-building, e.g. with regards to the operation and maintenance of water infrastructure. Capacity-building provided by companies could however also comprise capacity-raising measures with regard to planning and monitoring skills (Pegram et al., 2009a).

Furthermore firms might become involved in shaping policy dialogues and awareness raising activities, which might lead to further learning and adaptation processes. Through these activities, firms actively shape their governance environment by ideally helping to increase the adaptive capacity of surrounding communities through more stable water infrastructure better administrative capacity, better and more profound knowledge and planning. This type of contribution is no longer to companies and their immediate sphere of influence. Rather these activities can take place at very different levels ranging from local municipalities to the basin levels as well as in the national context (Loorbach, Van Bakel, Whiteman, & Rotmans, 2009).

In the following section I briefly discuss potential drivers for business to engage in these strategic options with regard to sustainable water management.

Potential motivational patterns

In discussing the motivations and drivers I follow the approach of Bansal (2005) in discussing resource-based factors on the one hand and institutional drivers on the other.

Internal or resource-oriented drivers are those factors affecting the resource base of a firm, ranging from human resources to financial considerations. Natural resource constraints and the cost of resources are also included in this category (Hart, 1995).

Human resources are influenced by employee motivation as well as the overall relevance of sustainability policies within a firm (Swanson, 2008). Other factors include the availability of resources (organizational slack) and the ability to manage capital and assets.

Turning to institutional drivers (Scott, 2001) I distinguish first between the influence of international sustainability norms, specifically in the area of corporate responsibility, water management and climate change as well as mimetic drivers and specific industry norms (Delmas & Toffel, 2004).

Secondly, competitive and market drivers are considered, including those deriving from consumers (Smith, 2008) and investors (King & Lenox, 2001) and thirdly the influence of external stakeholders, such as NGOs as well as other pressure groups, such as trade unions as well as community representation.

Finally the influence of government actors is discussed, focussing on the different roles government actors take (Fox, Ward, & Howard, 2002). Possible role of government actors range from mandating, which includes the strict monitoring and enforcement of regulations to softer modes of interactions, such as facilitating, partnering and endorsing. Specific attention is paid to the relevance of government capacity as a determining factor for government intervention (Schwartz, 2003).

The analysis is based on the premise that government actors at several levels need to dispose of a certain capacity in order to take on certain roles vis-à-vis business actors as a regulator and/or partner. These capacities rely on the availability of certain financial and human resources, but also a certain capacity to engage a wide range of actors. On the other hand the lack of these capacities can also act as a certain motivator for business. Perceived inability at the government level to address certain challenges may prompt business to provide these functions (Kranz, 2010).

In the following section, the framework developed in the previous sections is applied to the case of the mining industry in South Africa.

Indicative case study

Case description

The case study only serves as an indication for possible manifestations of business contributions and potential drivers. They are described in more detail in Kranz (2010). The overall case setting is provided by the mining industry in South Africa.

South Africa was chosen as a case study country for the following reason. South Africa is an increasingly water-stressed country (Ashton & Hardwick, 2008), which is faced with water quality deterioration, water scarcity and the challenge of providing water services to an increasingly urbanized population. South Africa is likely to be severely affected by progressing climate change (Mukheibir, 2008). Specifically, some industrial regions are likely to suffer most from decreasing water availability. It thus combines typical water problems of the industrialized world with those of developing countries offering a broad spectrum of case features.

In terms of the governance context, South Africa is an emerging economy with a significantly developed industry sector and also a relatively stable national level government. At the same time, variation at the provincial level allows for an analysis of the role of government capacity, represented by the situation in four of the nine South African provinces chosen for the case analysis. Government

capacity ranges from relatively well developed institutions in Gauteng to under-capacitated administrations in Limpopo province.

Among the South African industry sectors, I chose the mining sector and specifically operations in the gold, coal and platinum mining industries, located in four different provinces. Mining per se has a significant impact on water resources due to pollution incidents, freshwater abstraction as well as infrastructure developments to assure supply (Ashton, Love, Mahachi, & Dirks, 2001). The South African mining industry furthermore has undergone significant changes after the end of apartheid. In addition to re-entering world markets, significant restructuring took place and also a significant reorientation in the relationship to government actors. Whilst the industry was deeply entrenched with the apartheid government, new forms of interaction are currently emerging, which present an interesting subject for study.

Overview of findings

Similar contributions were provided by the firms investigated, albeit to different degrees and levels of involvement. Firms are in most cases involved with planning and monitoring activities, some contribute by launching technological innovations, infrastructure development and financing. In some cases, also capacity-building and awareness-raising and agenda-setting activities could be identified. Larger- better resourced firms usually were involved with further-reaching and more contributions. In some cases these also had potentially more profound repercussions within the surrounding communities in terms of improving their ability to cope with climate change impacts, such as capacity-building for local communities, the initiation of stakeholder platform. Smaller firms, with limited resources and also less developed corporate sustainability norms, would only perform the minimum activities required by legislation – or even less in cases, where these requirements were only enforced inadequately. There were no case-specific patterns in terms of the mode of interaction as well; rather there is a correlation between certain contributions and the respective mode of interaction employed (e.g. capital –intensive infrastructure contributions were mostly realized through collaborative and partnership approaches).

The degree to which these activities eventually lead to the improvement of the adaptive capacity in the respective context is obviously rather debatable. Only a very limited assessment in this regard is possible based on the cases investigated. If we assume however, that access to more complete information about water resources, strengthened institutional capacities, more careful (infrastructure-related planning) as well as improved exchange with all relevant stakeholders will lead to increase adaptive capacities, firms' contributions in some instances could be considered

conducive in this regard. It clearly needs to be noted however that firm activities were very haphazard and also limited in this regard, mainly catering to own interests.

In thus discussing the determinants and drivers for the respective behavior, in fact the role of government actors, ranging from mandatory (i.e. regulation monitoring and enforcement) to more facilitation-oriented approaches, as well as resource-based considerations, i.e. firm internal factors, emerged as the most decisive drivers. The latter include the relevance of the resource water, available financial resources as well as the overall disposition of the firm to address sustainability and water challenges. Detailed within-case analyses furthermore display interactions among these as well as between these and other drivers, such as social drivers (NGOs, community groups and traditional authorities) as well as competitive (market, prices) and normative (international and national norms) drivers, which often exert an enhancing effect. Furthermore, a sequence of drivers could be identified, where certain drivers, such as government pressure and the relevance of resource constraints lay the foundation for the introduction of others. Next to strong government intervention, also certain weakness of (especially local) government actors constitutes a veritable driver in some cases.

In this context, there was also evidence that the most conducive contributions for addressing the water challenge and increasing overall adaptive capacity to climate change were developed where firms entered into a dialogue with government at multiple levels, most decisively however in the municipal context. This also indicates that the resource-driver, such as water scarcity alone does not suffice as a determinant of business contribution to climate change adaptation, but rather need to be complemented or channeled by the intervention of institutional drivers, most importantly government.

Conclusions and policy implications

Business has a crucial role to play when it comes to addressing climate change impacts. Next to the obligations to address and mitigate climate change emissions as part of the business strategy, companies can also play a crucial role in climate change adaptation in increasing their own resilience (Linnenluecke et al., 2010), but also contribute to overall adaptiveness through interacting with and enabling their surrounding communities. The South African Mining industry offered insight into some potential contributions in this regard, but also persisting limitations. The latter seem to be partly dependent on the motivational pattern for firms and most decisively on the respective governance context. While the dependency and thus vulnerability of the firm itself to environmental change

definitely plays a role in determining firm behavior, yet the role of government as a regulating and/or facilitating factor emerged quite strongly.

Thus, in terms of the policy implications that can be drawn from the research conducted, a combination of different drivers and building on the respective inherent disposition of companies appears to be advisable for eliciting a corporate contribution to addressing water challenges. The necessity for governments to play a strong role, to interact with a wide range of actors and to diligently combine different policy tools remains a valid demand, especially with view to beneficial long-term implications. However, the capacity necessary to fulfill this role probably needs to be viewed more differentially than before. Capacity-building measures are still warranted in areas of limited statehood and should be targeted not only at creating a shadow of hierarchy and improving the financial viability but also at improving government the ability to cooperate and engage with corporate actors and activate their internal motivation to take action.

The results have their clear implications for the debate on governance for sustainable development and the relationship of private actors and the state in emerging economies. From a more global perspective, they are of relevance for advancing the discourse on business and water management.

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