



## Towards Sustainability: Managing Integrated Issues of the Brown and the Green Agenda in Water Governance and Hazard Mitigation

By Shabana Khan

*There is an increasing recognition that tensions between the brown (pro-poor urban development) and the green (sustainability) agenda, often seen as potentially contradictory, need to be reconciled. This paper finds that the two agendas are not mutually exclusive and as a result their spatial inter-relationships reflect their interlinked causes that need to be understood and planned accordingly. It elaborates on the three prevailing spatial inter-relationships of dominance, complementarity and competition that not only depict varied issues to be dealt with but also indicate potential solutions. The paper assesses these inter-relationships primarily for the water related hazards and governance issues in Dwarka, a sub-city of Delhi, India. It also suggests that an understanding of these spatial inter-relationships could add to the effectiveness of the participatory approach to address critical issues of sustainability, such as water.*

### Introduction

Sustainability has emerged as a major challenge for urban growth and development, particularly in the context of climate change. While concerns for the brown agenda relating to pro-poor urban development and the green agenda of ecological sustainability have existed for decades, in recent years there has been an increasing emphasis placed on integrating the two for sustainable development (Allen et al 2002, Bolnick et al 2006). This brings new questions such as, how to combine the two agendas rather than looking at these as alternatives or even how to weigh the relative importance of the brown agenda of environmental health vs. the green agenda concerning rights of the future generation (Bolnick et al 2006).

The enquiry into these questions exposes the paradox that the conflicts between the two well defined agendas are superficial and largely socially constructed (Bolnick et al 2006). Promoting one concern over the other has counter effects as the competition for recognition, resources and support keeps one to remain unattended (Allen, et al., 2002). In some cases planning for only one agenda may trigger another. As the two agendas look into the needs of different generations of the same species, they are not mutually exclusive and their demarcation not just neglects the continuum and overlaps of needs, but it also has an implicit assumption that these issues can be dealt in isolation. An integrated planning of the two agenda is not only desirable but also crucial for the sustainability of cities.

This paper looks into spatial inter-relationships of the brown and green agendas that provide an access to integrate the two. It is based on the case study of Dwarka, a sub-city of Delhi, India for issues relating to water governance and hazard mitigation. The findings are based on both secondary data (collected from libraries, newspapers and internet) and primary data (obtained from the residents of Dwarka through a



questionnaire survey). The questionnaire survey was conducted in six different housing groups of Dwarka including Delhi Development Authority (DDA) housing, Cooperative Group Housing Societies (CGHS), resettlement colony, unauthorised regularised area (informal housing), urban village and plotted development (individual housing). These housing types represent different socio-economic characteristics that influence both water governance and response to related risks.

## Conceptual Background

The Agenda 21 (1992) and the Habitat Agenda (1996) shared a common goal of sustainable development and suggest integrating green (environmental) and brown (human) agenda as an essential step for urban growth and governance (Allen et al., 2002). Despite having different priorities, the strength of the green and the brown agenda lies in their union to achieve urban sustainability (Allen, et al., 2002). Integrating the two agendas creates opportunities for securing a better livelihood not only for the current but also for the future generations.

Another layer of integration is added by the Hyogo Framework for Action [HFA] (2005-2015) that recognizes the need for integrating disaster risk reduction with plans and policies for sustainable development and climate change at different levels (UNISDR, 2007). It also emphasises for an integrated multi-hazard approach for risk assessment and disaster management including prevention, mitigation, preparedness, response and recovery for sustainable future (UNISDR, 2007). However, challenges emerge in integrating different focus and methodologies of risk management and sustainable development, and fewer studies have looked into this aspect.

As the two agendas relate to different aspects of hazards (one with occurrence and another with vulnerability), there is a scope for linking mitigation with sustainable development by having a deeper enquiry into their nature and relationships over space. McGranahan & Satterthwaite (2000) have differentiated the two agendas in terms of priorities, scope, scale, timeframes and attitudes, which not only help to understand the nature of the two agendas but also give access to integrate the two by having a multi-scalar perspective of issues relating to the current and future sustainability (table 1).

**Table 1:** Differentiating Characteristics of the Green and the Brown Agenda

Characteristics	Green Agenda	Brown Agenda
First order impact	Ecosystem health	Human health
Timing	Delayed	Immediate
Scale	Regional and global	Local
Worst affected	Future generation	Lower income group
Attitude to nature	Protect and work with	Manipulate to serve human needs
Attitude to people	Educate	Work with
Attitude to environmental services	Use less	Provide more
Aspect emphasised in relation to water	Overuse - need to protect water resource	Inadequate access and poor quality
Typical proponent	Environmentalists	Urbanists

Source: McGranahan & Satterthwaite, 2000.

The green agenda, also known as environmental agenda or climate change agenda, may directly relate to the nature and intensity of natural hazards, particularly of those relating to water. As advocated by the environmentalists, the prime concern of the green agenda is to maintain the ecosystem health for a sustainable development, and it focuses on issues of natural environment depicting ecosystem conditions and services, such as water availability or pollution (Allen, et al., 2002; UN-HABITAT, 2009b). This agenda aims for an inter-generation equity for resource use and liveable environment in long-term over a regional or global scale (Allen, et al., 2002; McGranahan & Satterthwaite, 2000). However, the severity of these issues in certain areas not only threatens the future generation but also puts the current generation at risk. The increasing concerns for the green agenda in developing countries are also attributed to the rapidly declining resources and severe environmental degradation due to high population growth that puts the sustainability of various ecosystems functions at risk, particularly in the face of climate change.

The brown agenda, on the other hand, depicts vulnerability of the urban population. It is concerned with human livelihoods in urban areas, such as fulfilling basic needs of food, housing or fuel, accessibility of education or medical facilities, and the quality of life as influenced by air or water pollutions (Allen, et al., 2002; UN-HABITAT, 2009b). It is mainly propagated by the urbanists for an equitable distribution of resources among the society members contributing to an intra-generational equity (McGranahan & Satterthwaite, 2000). The attention is more on the lower income group of the society and issues, such as quantity, quality and accessibility of resources to be dealt at the local scale and in an immediate time frame (ibid). These factors may play a crucial role in hazard response and therefore, demarcating areas of the brown agenda could also be helpful in disaster risk management.

A simple coexistence of the two agendas, however, is unlikely as they are influenced by various socio-economic and political processes operating at different scales. The subsequent variations in the nature and intensity of the two agendas, and hence the strategies for an integrated planning of the two would not only differ across the cities from developed and developing countries but also within national and city boundaries. As the two agendas are not mutually exclusive, mapping their spatial inter-relationships is likely to bring out shades of green and brown agendas and their combinations that need to be understood and planned accordingly for effective water governance and hazard mitigation. Broadly, three kinds of spatial inter-relationships are noted to exist which have their own gradations that add to the complexity. These are as follows:

- 1. Dominance:** In this spatial inter-relationship even though both agendas may coexist, one dominates the other, and thus derives the local interests and actions. There can be two sub-types of this category including areas dominated by the brown agenda (such as slums and low income groups) and areas dominated by the green agenda (such as areas experiencing depletion or degradation of natural resources). As one agenda dominates the public opinion, it is important to put an emphasis on integrated solutions to avoid ignorance towards another.
- 2. Complementarity:** These include areas where both agendas overlap and in some cases they propel each other. For example, lack of drinking water exerts pressure on the ground water and thus threatens human and environmental health for both current and future generations. One positive outcome of this inter-relationship is that visible coexistence of the two agendas helps to gain public interest and participation for integrated solutions.
- 3. Competition or conflict:** In the third category two agendas compete to gain attention and coerce action. These areas generally include zones of new urban developments, where sensitive ecological systems (such as lakes or streams)

struggle for their existence against the need of urban growth. In such case it is important to keep in mind that the issues raised for any agenda are not completely dismissed to cater another, and integration is sought even when the demands of a particular agenda is accepted over another.

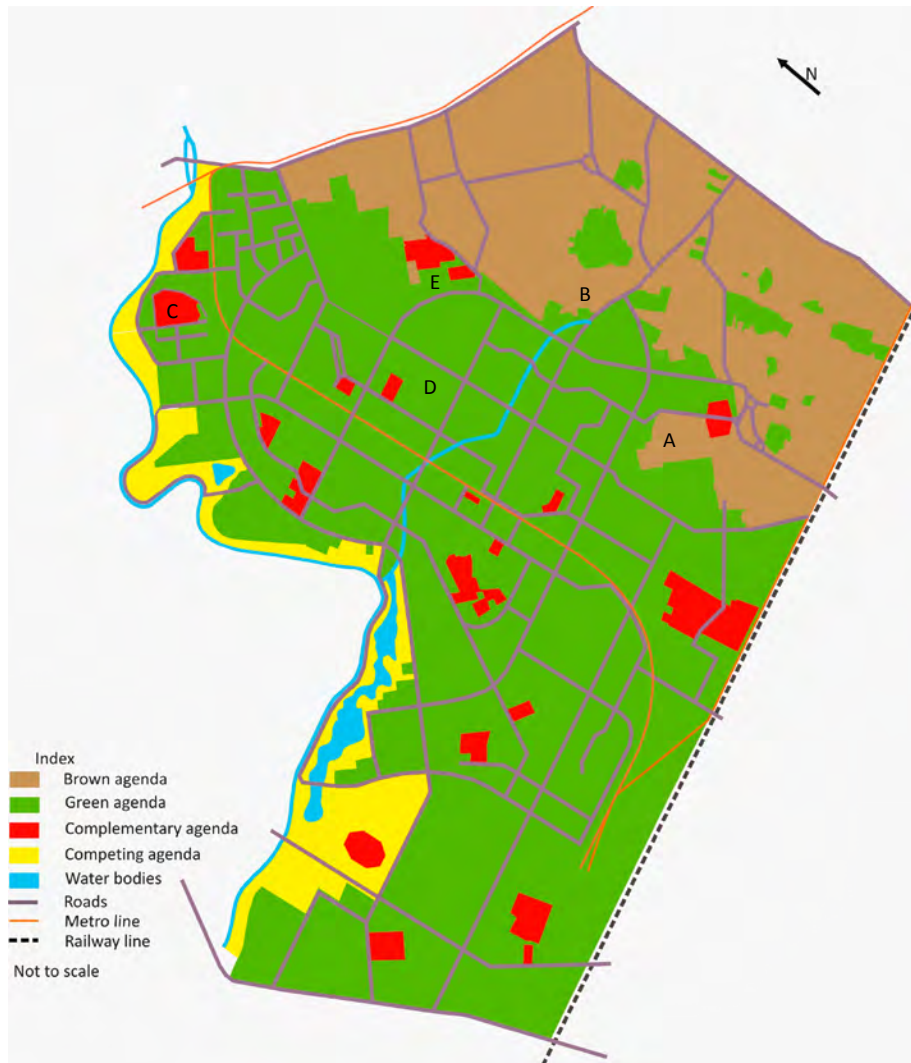
These spatial inter-relationships between the brown and the green agenda portray varied issues relating to local vulnerability and governance, which can be planned accordingly for integrated solutions. The case study of Dwarka is analysed in the following sections to depict the significance of spatial inter-relationships in water governance and hazard mitigation.

### Dwarka – A sub-city of Delhi, India

Dwarka is a sub-city of the Capital of India, which is planned by the Delhi Development Authority (DDA) to accommodate over a million population without adequate provision of water resources (Ruet, Saravanan, & Zerah, 2002). Water governance in the sub-city involves multiple actors including Delhi Development Authority, Delhi Jal Board (DJB), private water tankers, bottled water suppliers, resident welfare associations, community groups and individual households. Dwarka faces issues of social inequity in terms of income, housing, infrastructural development and distribution of water along with environmental concerns, such as ground and surface water degradation. Common water related hazards in Dwarka include water scarcity, flooding, ground water depletion and water pollution. The media frequently reports issues of scarcity and poor water quality in the sub-city. Conditions get worse during the summer season. Further, a steep ground water decline in the area threatens the availability of clean water not just for the present but also for future generations. According to Water Quality and Assessment Authority, the ground water quality in the southwest Delhi including Dwarka is threatening with salinity above 3000 $\mu$ s/cm, fluoride above 1.5mg/l and nitrate above 45mg/l. A major reason for ground water pollution is noted to be excessive extraction with limited recharge. An overview of the situation gives a general impression that the entire area is facing issues relating to the brown and the green agendas. However, an in-depth view shows variation in the spatial inter-relationships of the two agendas. An assessment of water related hazards and governance issues show variations in the nature and intensity of hazards and human vulnerability associated with the brown and the green agenda over space. The spatial variations in the inter-relationships between the two agendas for water related hazards in Dwarka also reveal differential need and strategies for effective response. The three broad inter-relationships between the green and the brown agenda are clearly noted in Dwarka (figure 1).

**Dominance:** Areas of the green and the brown agenda dominance is noted to be distributed throughout the region. With poor water quality and declining ground water, even though Dwarka is facing green issues, the dominance of the green agenda is noted in the residential areas of medium and high income group developed by the Delhi Development Authority and Cooperative Group Housing Societies. Areas dominated by the green agenda also include those developed for institutional and commercial purposes. It can be said that one reason for green agenda dominance in these areas is an insignificant or trivial presence of the brown agenda. It is noted during the field survey that these areas are experiencing ground water decline partly because they depend on ground water for their basic needs and partly because of overall decline in ground water by continuous water extraction by private water tankers or other authorised and unauthorised bodies. Many of these areas depend on private water tankers which provide water from illegal bore wells located within Dwarka or nearby areas in or outside of Delhi (Khandekar, 2013). While water needs of the current generation are met, it poses

**Figure 1:** A Schematic Representation of Spatial Inter-relationships Between the Green and the Brown Agenda in Dwarka, Delhi, 2012.



Source: The author

Note: RC: Resettlement Colony; UA: Unauthorised Area; UV: Urban Village; CGHS: Cooperative Group Housing Society; DDA: Delhi Development Authority.



A: Buy water when no supply - RC



B: Waiting for water - UA



C: Collecting drinking water - UV



D: Water purification - CGHS



E: Tank water availability - DDA

question on the sustainability of this resource in the near and distant future. In the absence of clean drinking water from Delhi Jal Board, these areas are forced to manage their water issues either by buying and purifying ground water, which make them vulnerable to unreliable water availability and unchecked water quality.

The brown agenda, on the other hand, is noted clearly in unauthorised regularised areas (informal housing) and resettlement colonies of low income group, which do not extract ground water or buy water from private tankers as they depend on piped water supply from the Delhi Jal Board. The prime factors of vulnerability as mentioned by the local people in these areas were attributed to their low income and location. Some houses are better positioned in terms of alignments of pipelines which get them more water as compared to those located at a distance and often end up with less or no water. As these people cannot afford to call private tankers, they have to either wait for water supply or bring water from public taps located at a distance that takes away their time from their regular occupation and burdens them with loss of income. Irregularity, delay and at times poor quality of water also causes head ache, loss of sleep, stomach illness and other

water-borne diseases. These areas are mainly located in the northern part of Dwarka, most of which were not included in the planning of the sub-city as they fell into the category of built up areas.

While it is easier to recognise areas of the brown and the green agenda dominance, there can be further differences within these sub-categories. For example, even though both unauthorised regularised areas and resettlement colonies in Dwarka have dominance of the brown agenda, the intensity of brown issues in resettlement colonies is noted to be higher than unauthorised regularised areas mainly due to income differences. Many people in resettlement colonies reported to depend upon bottled water in case of no water supply, particularly during summers, for which the price they pay consumes a greater part of their income than unauthorised areas of low to medium income group. Similarly in the green agenda dominant region, the intensity of green issues is found to be higher in Cooperative Group Housing Societies than Delhi Development Authority housings and institutional areas, which have less dependence on ground water than the former group.

**Complementarity:** These are the places where both the green and the brown agenda co-exist, complement and at times propel each other. In parts of Dwarka, water scarcity is noted to be critical for both present and future generations. This is noted to be particularly in a serious state in urban villages and plotted development (individual housing), where there is a sharp gap in water demand and supply due to inadequate infrastructure and high dependence on ground water. Excessive ground water extraction has not only resulted into a faster depletion of ground water but has also led to degradation of its quality. The residents of these areas reported varied health issues apart from facing economic burden of power bills and social stress due to local fights for water. These areas are facing double pressure of the brown and the green agendas, and the rising concerns have led some communities to plan for the local resources. In Pochanpur village of Dwarka, the local community including school children, youth, women and elderly summing up to 150 people come together to desilt and revive local lake in summer 2012 (Correspondent, 2012). This effort though indicates a positive action from the community to deal with complementary agendas, further efforts are required to ensure the sustainability and extension of such actions across all affected areas of Dwarka.

**Competition and conflict:** In many areas of Dwarka the green and the brown agendas are also noted to be competing for recognition and support. A study by INTECH shows that Delhi has lost nearly 21 lakes in 1997-98 attributed to the new developments, and some of these were in Pappan Kalan (erstwhile Dwarka) (Nandi, 2013). The threat is however, not yet over. Due to high demand for land, the vacant lands along with agricultural belt of Dwarka have been approved to be built by the High Court to fulfil the housing demands for urban growth (Nair, 2010). This has caused disappearance of many natural resources and ecosystem services. The second phase of Dwarka development, which is yet to be constructed, thus threatens the displacement of many ecosystem species and local ponds. The competition and conflict between the two agenda also remains in areas not yet planned or agricultural lands under private ownerships. Besides, degraded streams which now function as drains and carry sewage (such as Najafgarh drain and Palam drain) to serve brown agenda, also call for public attention and recognition for both environmental and human health.

### Relevance to participatory approach

Both Habitat Agenda and Agenda 21 advocate for Local Agenda 21 that calls for local actions for sustainability (Allen, et al., 2002). The later finds participative approach to be effective in decentralisation of decision making where local participants could own

**Table 2:** Spatial Inter-relationships of the Green and the Brown agenda in Dwarka.

<b>Spatial Inter-relationships of agendas</b>	<b>Areas</b>	<b>Vulnerability</b>	<b>Mitigation</b>
Dominance of the green agenda	Ground water depletion in newly developed areas (CGHS & DDA housings)	Using ground water to reduce the cost of buying water; exposure to water borne diseases	Water harvesting and recycling
Dominance of the brown agenda	Resettlement colonies (low income) and unauthorised regularised (informal) areas	Low income, water scarcity, loss of work, water-borne diseases	Enhancing efficiency in water supply as per the needs of the community; creating awareness for water purification and conservation
Complementary agendas	Urban villages and plotted development (individual housing)	Vulnerability to diseases due to polluted ground water and inadequate infrastructure for water supply	Awareness of health issues and building infrastructure
Competing agendas	Expansion of built up areas in agricultural belt harming local natural resources and ecosystem services (local lakes and streams)	Loss of ground and surface water resources and exposure to pollution	Creating spaces for natural ecosystem; participation of various stakeholders including local communities to keep the drain clean and revive local lakes

Source: The author

accountability and find more meaningful, acceptable and lasting solutions for themselves. This may also give them a sense of ownership and responsibility to deal with issues over a longer period of time even if it means changing practices, such as change in water use behaviours. It further adds knowledge from the diversity of stakeholders and brings together their varied perception and experiences along with traditional and contemporary practices to deal with issues of concern (Hordijk & Baud, 2011).

The local communities, however, in many cases may lack detailed understanding of regional or global challenges, such as climate change in general or its immediate impacts in particular. In such case spatial assessment of inter-relationships between the two agendas may help them to understand local issues and give them access to an integrated planning for the two agendas in the local context. In terms of hazard mitigation, it is important to note that the nature of the two agendas and associated vulnerability would vary over space. In such case understanding of spatial inter-relationships of these agenda can make participatory approaches more useful for both efficient water governance and hazard mitigation (table 2).

A wider part of Dwarka is dominated by the green agenda. Even though water harvesting has been made mandatory for the buildings with plot area of 100 square meters or more in Delhi by the Central Ground Water Authority, the rule is not followed everywhere in a similar fashion (Biswas, 2011). A study in Dwarka shows that 78 per cent group housing societies have made some provisions for rain water harvesting, however, their usefulness and maintenance is suspicious mainly due to lack of public participation (Biswas, 2011; Dwarka Parichay, 2012). In a larger part of Dwarka such plots are occupied by CGHS and DDA housings of middle and high income groups who

even if want these structures to work, they find it difficult to get support from the local government. This calls for a review of the Bhagidari approach from the Delhi government that aims for local participation to enhance its usefulness. On the other hand, in the brown agenda dominated areas of low income group a regular water supply along with spreading awareness for water purification and its judicious use can be effective hazard mitigation for water scarcity and health issues. There is evidence that poor communities are willing to pay for infrastructure, which is also noted during the interviews with local people in the resettlement colony surveyed. A participatory approach in this case can help to identify the local needs and efficient ways to deliver clean water.

In areas of complementary agendas spreading awareness is more critical for hazard mitigation as heavy dependence on ground water is causing threats for water availability to both present and future generations. Local efforts for ground water recharge and water purification are essential and need to be supported by the government. Efforts can be directed towards making such areas self-sufficient in terms of water. Similarly, in areas of competing agendas, there is an opportunity to involve community to conserve natural resources. Further, the government decision making should also take care of environmental concerns along with urban needs for integrated solutions.

Apart from hazard mitigation, an understanding of spatial inter-relationships of the two agenda also helps local people to overcome their fears or resistance for top-to-bottom rules imposed on them. In Dwarka, prohibition of the use of ground water has particularly raised tension in the CGHS and some DDA housings which partly depended on ground water for their basic needs. An understanding of spatial inter-relationships of the two agenda may help people to have a wider perspective by including equity issues of both current and future generations. However, such understanding is also needed to be supported by other technical and infrastructural support.

Despite multiple benefits, the participative approach has been contested on the basis of its participants, particularly because of dominant influence of some participants (Gopinath & Gopinath, 2008). In this case, addressing a range of green and brown issues in an integrated manner over space will allow a wide range of stakeholders to participate, and thus will help to overcome the lobby of influential participants at the scale of a sub-city.

## Conclusion

In the face of rising threats of climate change, both green and brown agendas are gaining currency for a sustainable urban development. An increasing emphasis on integrating the two agendas has posed various methodological challenges. A spatial assessment of the two agendas shows that they share varied inter-relationships of dominance, complementarity and competition over space which can be mapped and planned. These inter-relationships reflect varied water governance systems and hazard vulnerability, the understanding of which can help to find integrated solutions for the two agendas and accordingly plan mitigation strategies. It can aid the use of participatory approach not only by informing people about integrated brown and green issues but also by enhancing local acceptance and participation in finding ways for integrated solutions for effective hazard mitigation and water governance.



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EADI

Kaiser-Friedrich-Strasse 11  
D-53113 Bonn  
Tel.: (+49) 228 . 2 61 81 01  
info@chance2sustain.eu  
www.eadi.org  
www.chance2sustain.eu



**Chance2Sustain** examines how governments and citizens in cities with differing patterns of economic growth and socio-spatial inequality make use of participatory (or integrated) spatial knowledge management to direct urban governance towards more sustainable development.

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