Understanding Environmental Concerns:

An Indian Experience of Sustainable Domestic Water Consumption[1]

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"Earth provides enough to satisfy every man's need, but not every man's greed"

--- Mahatma Gandhi

This paper explores environmental beliefs and attitudes, and their relationship with sustainable water consumption in the rural population of two districts of West Bengal (India), i.e. Purulia and North 24 Parganas: the former facing scarcity of water while the latter suffering from arsenic contamination. The arid Purulia district of West Bengal have scarcity of water. During the dry season, existing ground and surface water supplies dry out because the water table is dependent on limited monsoon rains. In addition to this, West Bengal is the worst arsenic affected state of India and North 24 Parganas district is severely suffered region where most of the groundwater is contaminated with arsenic. Thus, while the villagers of Purulia face a *visible risk of scarcity* of water, the villagers of North 24 Parganas face an *invisible risk* whose consequences may be more serious but are more complex to interpret. Under these two different contexts, the present study aims to examine water related environment beliefs, in terms of the emerging networks of flow of toxicities, new ideas and technology adopting the sustainable consumption framework.

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Background of the study

Improving access to safe drinking water in India is one of the major challenges of social development. 'Fresh water', a commodity which was until recently available freely, is increasingly becoming a dear commodity due to large-scale depletion of natural resources and mismanagement of water reservoirs. Water scarcity, conflicts and contamination and pollution are glaring problems in various parts of India. The extent, to which drinking water requirements will be catered to, as against other competing demands, depends on the nature of institutions that mediate such demands from various sectors. Reforms in rural drinking water supply sector were adopted in 1999 in the country. The basic concept of the reforms includes community participation in planning, implementation, operation and maintenance (O&M) of the schemes of its choice. This implies a paradigm shift from the supply driven to a demand responsive approach, from centralized to the decentralized service delivery, from the top-down to the bottom-up delivery approach and ultimately to change the role of the government from service provider to a facilitator.

Within **environmental sociology**, the empirical study of consumption behaviour was mostly influenced by psychological model of human behaviour. Foundational scholars of environmental sociology (Dunlap and Catton, 1979[4]; Catton and Dunlap, 1980[5]; Dunlap et al., 2000[6]) had focused mainly on the interaction between society and the environment, covering the social factors that lead to environmental degradation and the influence of the environment on social conditions. They had applied the attitude-behaviour model, popularly known as New Environmental Paradigm (NEP) scale, to understand environmental concerns. In Europe, Mol, Spaargaren and other scholars have expressed interest in ecological modernization, treadmill production, sustainable consumption and sociological understanding of environmental flows. Spaargaren (2003)[7] employs social practice model to explore the domestic consumption of utility products and services. They

[4] Dunlap, R. E. and W. R. Catton, Jr. (1979) "Environmental Sociology." Annual Review of Sociology, Vol. 5, pp.243-273.
[5] Catton, W. R., Jr. and R. E. Dunlap. (1980) "A New Ecological Paradigm for Post-Exuberant Sociology." American Behavioral Scientist, Vol. 24, pp.15-47.
[6] Dunlap, R. E., Kent D. Van Liere, A. G. Mertig and R. E. Jones. (2000) "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." Journal of Social Issues, Vol. 56, pp. 425-442.
[7] Spaargaren, G. (2003) "Sustainable Consumption: Theoretical and Environmental Policy Perspective", Society and Natural Resources, Vol. 16, pp. 687-701.

explored these issues from a macro perspective going beyond the empirical and attitudinal approaches of social psychology. Many other approaches have recently become oriented towards sustainable consumption research, such as situational and lifestyle-based explanations, as well as technology-oriented and user-centred approaches (Spaargaren and Van Vliet, 2000[8]; Autio and Heinonen, 2004[9]; Heiskanen et al., 2005[10]).

Within **general sociology**, environmental issues were frequently discussed as exemplary cases illustrating the new dynamics of change in global modernity addressing the weakening power of nation states over culture, capital and technology (cf. reflexive modernization theory, risk society theory, social constructivism). However, this model demands a new role of nation-states that have to give way to actors and arrangements operating in the global as well as local levels. In this context, 'sociology of flows' (Urry, 2000)[11] opens up various perspectives in environmental sociology, by focusing especially on the material and spatial dimension of social life (Mol and Spaargaren, 2005)[12].

The **case of India** is interestingly different from dominant western paradigm. In this country, nearly thirty percent population lives below the poverty line. Consequently, government has to place greater emphasis on 'subsistence' rather than 'sustainable' livelihood and balance between developmental and environmental imperatives. The noted environmentalists, including the Chipko movement exponent Sunderlal Bahuguna, Vandana Shiva and Medha Patekar have questioned the strategy of the government regarding common property resources through people's participation and environmental movement. In academics, the works of Guha (1989,

[8] Spaargaren, G. and B. V. Vliet. (2000) "Lifestyles, Consumption and the Environment: The Ecological Modernisation of Domestic Consumption", In: Ecological Modernisation Around the World: Perspectives and Critical Debates, eds. Arthur P. J. Mol and David A. Sonnenfeld. Frank Cass: London, 50–76.
[9] Autio, M. & V. Heinonen, (2004) "To Consume or Not to Consume? Young people's environmentalism in the affluent Finnish society", Nordic Journal of Youth Research, Vol.12, No.2, pp.137–153.
[10] Heiskanen, E., P. Kasanen, and P. Timonen. (2005) "Consumer Participation in Sustainable Technology Development", International Journal of Consumer Studies, Vol. 29, No. 2, pp.98–107.
[11] Urry, J. (2000) "Mobile Sociology", British Journal of Sociology, Vol. 51, No. 1, pp. 185 – 203.
[12] Mol, Arthur P. J. and G. Spaargaren. (2005) "Towards a Sociology of Environmental Flows", International Conference on 'Governing Environmental Flows', Environmental Policy Group Washington University and the International Sociological Association, RC-24, June 13 – 14.

2000)[13] and Dwivedi (2001)[14] pertaining to water concerns, are well received internationally. However, their works do not strictly follow environment-society relationship from sociological perspective (Mol, 2006)[15]. With this backdrop, the present paper attempts to bridge an existing knowledge gap by combining micro (individual level) and macro (institutional level) perspectives of sustainable water consumption in India.

In the above context, this study focuses on groundwater, the naturally available resource for the rural people. So far it has been available freely and easily and could be obtained flexibly from all available sources (open-well, tube-wells, pond, river, lake, stream, canal, spring). While developing groundwater resources promise to help in poverty removal, the most formidable groundwater challenge is to attain a sustainable use and management of groundwater in vast and growing regions where the resource is under severe threat. It may be noted that in India in the recent past water crisis has risen even in regions which did not have water deficit and experienced green revolution only a few decades ago, creating a general need for responsible management of water resources.

Objectives

The present paper has the following major objectives:

- to address the role of state and civil society in the maintenance of sustainable water consumption using a historical perspective of Indian water policies and programs.
- to measure the general and specific environmental beliefs related to water consumption employing the New Environmental Paradigm (NEP) in two risk situations- scarcity of water and arsenic pollution;

[13] Guha, R. (1989) "Radical American Environmentalism and Wilderness Preservation: A Third World Critique", Environmental Ethics, Vol. 11, pp. 71-83. and
Guha, R. (2000) Environmentalism: A Global History. Longman: New York.
[14] Dwivedi, R. (2001) "Environmental Movement in the Global South: Issues of Livelihood and Beyond", International Sociology, Vol. 16, No. 1, pp. 11-31.
[15] Mol, Arthur P. J. (2006) "Environmental Sociologies to Environmental Sociology: A Comparison of U.S. and European Environmental Sociology", Organization & Environment, Vol. 19, No. 1, pp. 5-27.

- to examine the relationship between social institutions, cultures and beliefs of the and the everyday consumption pattern of the people; and

Thus, the study aims at exploring the relationship between socioeconomic characteristics of people, interpretation of risks, beliefs, state and civil society action, and their impact on everyday consumption behaviour.

Environmental Beliefs and Concerns

Environmental beliefs can be defined as ethical-normative cognitions concerning the relationship between humans and nature. Analogous to nature images, environmental beliefs are often classified according to their position on a dimension ranging from anthropocentrism to eco-centric (Catton & Dunlap 1980)[16]. Individuals holding anthropocentric environmental beliefs view nature as subordinate to humans, who are seen as rulers or managers of the natural world. Individuals holding eco-centric environmental beliefs regard nature as the most important reality, and view humans as only part of that reality.

Environmental beliefs or worldviews have been mentioned as potential predictors of conservation behaviour (Scott & Willits, 1994)[17]. Gray (1985)[18] posits environmental beliefs as underlying a system of attitudes and beliefs that determine behaviour toward the environment. According to these authors, environmental beliefs are referential frameworks, which are used when interacting with the environment.

In order to assess individual differences in environmental beliefs, Dunlap & Van Liere (1978) have developed the New Environmental Paradigm (NEP) scale. According to Stern, Dietz, and Guagnano (1995)[19], the NEP–HEP is ‘‘a paradigm or worldview—a set of generalized beliefs about human– environment relations’’ (p. 783). If, as they assert, these environmental beliefs are indirect predictors of specific

[16] Catton, W.R., & Dunlap, R.E. (1980) A new ecological paradigm for post-exuberant sociology. *American Behavioral Scientist*, 24(1), 15-47
[17] Scott, D., & Willits, F. K. (1994). Environmental attitudes and behavior: A pennsylvania survey. *Environment & Behavior*, 26, 239–260.
[18] Gray, O. (1985). Ecological beliefs and behavior. Westport, CT: Greenwood.
[19] Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The new ecological paradigm in social-psychological context. *Environment & Behavior*, 27, 723–743.

pro-ecological behaviours, then their predictive ability should be assessed along with the mediating variables. In theory, pro-ecological beliefs like those constituting a ‘‘New Environmental Paradigm’’ are precedents to environmental actions. Conversely, anthropocentric beliefs like the ‘‘Human Exceptionalism Paradigm’’ would preclude the development of pro-ecological behaviours. The HEP is a basic belief that humans are above nature and therefore do not have to regard it as they use up resources (Bechtel, Corral-Verdugo, & Pinheiro, 1999)[20]. The NEP scale was intended as a uni-dimensional measure of environmental beliefs, with low scores indicating anthropocentrism, and high scores indicating eco-centrism. The scale consists of fifteen items that cover three broad themes, i.e., humanity's ability to upset the balance of nature, the existence of limits to growth for human societies and the appropriate role of humans relative to the rest of nature. Studies employing the NEP scale have revealed relationships between eco-centric environmental beliefs and a wide range of socio-demographic variables (Arcury & Christianson, 1990)[21]. Although the dimensionality of the NEP scale has been contested in recent years, the NEP scale continues to enjoy considerable popularity as a uni-dimensional measure of individual differences in environmental beliefs.

If beliefs reflect attitudes it implies that beliefs about water as a natural resource should directly influence water-consumption behaviour. In addition, if SEB is also correlated with GEB, like the NEP–HEP, then these more general beliefs should predict consumption behaviours. (GEB) has been measured by using the HEP-NEP scale developed by Dunlap and Van Liere (1978, 2000)[22]. The earlier scale (1978) contains twelve items, (Albretch, D., Bultena, G., Holberg, E., & Nowak, P., 1982)[23], separated into three dimensions: a) a worldview of a ‘natural balance’ between humans and the rest of the nature, b) a perspective emphasizing the need to impose ‘limits to growth’ on human activities and c) a ‘human exceptionalism’ paradigm which sees humans as outside the rules of the natural world.

[20] Bechtel, R. B., Corral-Verdugo, V., & Pinheiro, J. Q. (1999). Environmental belief systems. United States, Brazil, and Mexico. *Journal of Cross-cultural Psychology*, 30, 122–128.
[21] Arcury, T., & Christianson, E. (1990). Environmental worldview in response to environmental problems: Kentucky 1984 and 1988 compared. *Environment & Behavior*, 22, 387–407.
[22] Dunlap, R. E., & Van Liere, K. D. (1978). The New Environmental Paradigm. *Journal of Environmental Education*, 9, 10–19. &
Dunlap, R. E., Van Liere, K. D., Mertig, A., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm:a revised NEP scale. *Journal of Social Issues*, 56, 425–442.
[23] Albretch, D., Bultena, G., Holberg, E., & Nowak, P. (1982). The New Environmental Paradigm Scale. *Journal of Environmental Education*, 13, 39–43.

SEB has been studied by using the scale developed and used by Victor Corral-Verdugo, Robert B. Bechtel and Blanca Franjio-Sing (2003)[24]. The scale contains eight items. Six items addressed a utilitarian view of water, sees it as an unlimited resource without restriction for human use. The other two items assesses due agreement of respondents with a vision of water as a limited resource to be conserved.

An attempt has been made to examine the relationships between socioeconomic and demographic characteristics on the one hand, and the HEP-NEP on the other. The former characteristics include age, sex, years of schooling, family income, occupation, family size etc.

Having explained the concept of environmental beliefs and its place in sustainable consumption, the following section presents the concept of sustainable consumption and the nature of debate on this theme. It shows how with continuous improvement in levels of living and development over centuries the world suddenly realized that it is not possible to have continuous increase in consumption for ever because increased global consumption implies deterioration in the resource base. However, to look for ways to have sustainable consumption is to look for alternative set of values.

Values and sustainable consumption in the global environment discourse

Sustainable consumption is a complex term, applied to consumers involves subjective issues, which include values, quality of life, and needs. The term "sustainable development" according to United Nations Conference on the Human Environment in Stockholm (1972), the IUCN World Conservation Strategy (1980), the Report of the World Commission on Environment and Development (the Brundtland Report, Our Common Future) (1987), and Agenda 21 following on UN Conference on Environment and Development or the Earth Summit in Rio (1992).

[24] Corral-Verdugo, V., Bechtel, Robert B. & Franjio-Sing, B. (2003). Environmental Beliefs and Water Conservation: An Empirical Study, *Journal of Environmental Psychology*, 23, 247-257.

The most often quoted definition of sustainable development is that of the Brundtland Report:

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*(WCED, 1987:43)[25].

This idea of unsustainable production and consumption is further elaborated in Chapter 4 of Agenda 21, the blueprint for sustainable development produced at the Earth Summit:

> *"We must consider the need for new concepts of wealth and prosperity, which not only allows higher standards of living through changed lifestyles but which are also less dependent on the Earth's finite resources, and more in harmony with the earth's carrying capacity."*

Chapter 4 of Agenda 21 also identifies that:

> *"...the major cause of continued deterioration of the global environment is the unsustainable patterns of consumption and production, particularly in the industrialised countries..."* and states that: *" ...achieving sustainable development will require both efficiency in production processes as well as changes in consumption patterns... in many instances, this will require a reorientation of existing production processes and consumption patterns, which have predominantly emerged from developed countries and which are being increasingly emulated in much of the world, including developing countries..."*

Though the documents cited above use the term 'sustainable consumption' none provide a definition of it. The United Nations Guidelines for Consumer Protection was expanded in 1999 to include a section on sustainable consumption and Clause 42 of the thus amended Guidelines takes a step towards defining sustainable consumption:

> *"Sustainable consumption includes meeting the needs of present and future generations for goods and services in ways that are economically, socially and environmentally sustainable."*

Environment literature emphasizes a change in values as one necessary step in solving environmental problems (Paavola, 2001)[26]. In this regard, the 20th century – characterized by a consumer-oriented culture – has led to a growing critique from

[25] World Commission on Environment and Development, (1987), Our Common Future, Oxford University
Press, Oxford.
[26] Paavola, J. (2001). "Towards Sustainable Consumption: Economics and ethical concerns for environment in consumer choices", Review of social economy, Vol Lix, no.2, June, pp. 227-248.

consumers. Over the past decade, this has given rise to new consumer profiles, which question their own consumption choices and values. According to UNEP, this increasing awareness about environmental and social issues is a sign of hope, on which governments and industry can build (UNEP, 2000)[27]. Sustainable consumption, leading to changes in values, demand, and product development has important implications for state as well as business (Cooper, 1998)[28].

However, different societies and cultures respond to dilemmas of development differently. At the moment, in literature on environmental sociology two different approaches to social aspects of environment can be discerned: one is distinctly American and another one is European. It may be argued that there is a need to look for multiple perspectives from the less developed countries which have different cultural and developmental concerns than the wealthy nations of the North.

Aurther Mol in *From Environmental Sociologies to Environmental Sociology: A Comparison of U.S. and European Environmental Sociology* presents the American and European perspectives on environmental sociology. He clearly mentioned that there are different histories of environmental sociological tradition in US and Europe.

> *"While there still exits a strong preference of more qualitative empirical studies in American Environmental Sociology compared with its European counterpart, this distinction seems to be diminishing somewhat recently."* (Mol, 2006:14).

He admits that the prevalence of empirical work is more focused in US than in Europe:

> *"An empirical foundation is definitely stronger in the United States than in Europe. The time when empirical research in United States was restricted to statistical analysis of large quantitative data sets has been gone for some time. US environmental sociology is getting equally strong in qualitative case study research, ethnographic research, focus group and so on, as for instance the articles in Cohen's volume show."(ibid)*

[27] UNEP (2000). "Sustainable consumption and production", Creating Opportunities in a changing world: report of the 4th International Business Forum, Berlin, 1999.
[28] Cooper, T. (1998). "Sustainable consumption: Green consumerism or downshifting?", International Sustainable Development Research Conference: Conference Proceeding, Leeds, UK, 3rd-4th April, pp. 61-67.

Starting with the founding father Dunlap and Catton Jr. the recent volume of Cohen has evidences of empirical work. Buttel had somewhat tried to depict a mixture of two traditions on both theory and practice. He also considered the role of civil society to be an important determinant in environmental perspective now a days.

> *"NGO are often seen as much as practitioners as multinational corporations or government." (Mol, 2006:15)*

Apart from US and Europe differentiation in the history of theory and practice, the south-north divergences are also important in present sustainable consumption literature. However, an explanation in the global context covering historical, economic and cultural issues is needed. There are two different theory of global environmentalism in the environmental literature. The thesis draws from two sources: Ronald Inglehart's post-material value thesis (e.g. Inglehart 1997)[29], and its critique (Brechin 1999[30]; Dunlap & Mertig 1997)[31]. The central theme of the two-way thesis is that there are two basic varieties of global environmental concern, divided between rich (Northern) and poor (Southern) societies (Guha 2000[32]; Guha & Martinez-Alier 1997[33]). The first is explained with *post-materialist values thesis,* according to which global environmentalism is seen as a derivate of post-materialist syndrome. Environmental concern is manifestation of typical post-material (modern) values in wealthy countries, such as self-expression and quality of life. The second, *objective problems thesis,* suggests that the citizens' real experiences of environmental hazards in poor countries motivate them to protect the environment.

While it has become even more apparent that there are significant national differences in the ways in which societies function and sustainable consumption research is therefore based on the interplay of social structures with the individual. The under mentioned figure (Figure 1) presents the typology based on James

[29] Inglehart, Ronald (1997) Modernization and postmodernization: cultural, economic, and political change in 43 societies. Princeton University Press: New Jersey.
[30] Brechin, Steven R. (1999) Objective problems, subjective values, and global environmentalism: evaluating the postmaterialist argument and challenging a new explanation. Social Science Quarterly, Vol. 80, No. 4, 793–809.
[31] Dunlap, Riley E. & Mertig, Angela G. (1997) Global environmental concern: an anomaly for postmaterialism. Social Science Quarterly, Vol. 78, No. 1, 24–29.
[32] Guha, Ramachandra (2000) Environmentalism: a global history. Longmann: New York.
[33] Guha, Ramachandra & Martinez-Alier, Juan (1997) Varieties of environmentalism: essays North and South. Earthscan: London.

Coleman's model for how to conceptualise social action (1986)[34]. The proposal is also inspired by Hedström and Svedberg (1996)[35] who have made a review of social mechanisms.

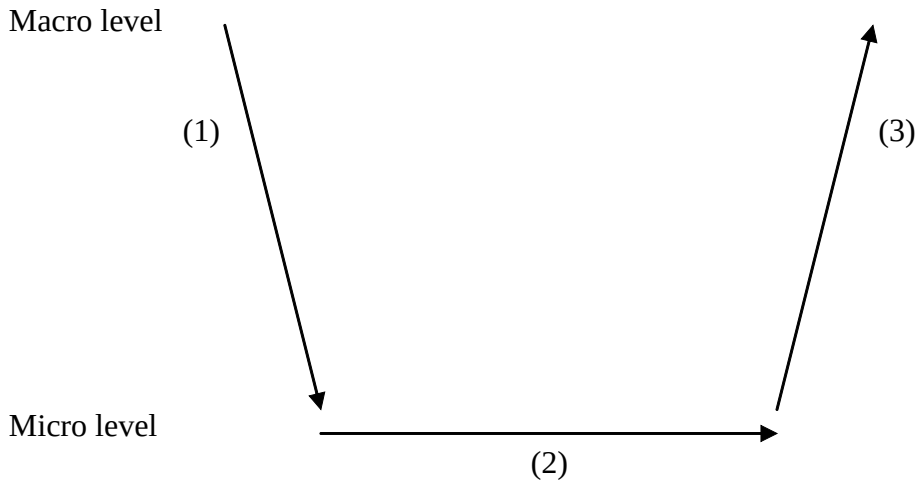

Figure 1: Macro-micro-macro relations
(Coleman 1986, adapted from Hedström & Svedberg 1996, 297)

The figure illustrates the three steps or types of mechanisms: macro-micro mechanism; micro-micro mechanism; and micro-macro mechanism. The first step covers the macro-to-micro transition showing how macro-level change entails changes in micro-level. Hedström and Svedberg call this step as *situational mechanism* (1996). The second step involves micro-to-micro step, an *individual action mechanism*, and it shows how individual desires, values etc. are turned into a specific action. The *transformational mechanism* as Hedström and Svedberg name it consists of the third step and it describes how these individual actions are transformed into a collective outcome, in the micro-to-macro level. [36]

Inspired by this example Haanpää applied it to explain sustainable consumption. It is described as a structural mechanism which moves from real world

[34] Coleman, James S. (1986) Social theory, social research, and a theory of action. American Journal of Sociology, Vol. 91, 1309–1335.
[35] Hedström, Peter & Swedberg, Richard (1996) Social mechanisms. Acta Sociologica, Vol. 39, No. 3, 281–308.
[36] This concept was first used by Leena Haanpää in a paper titled 'Structures in sustainable consumption research: Macro- and micro-level factors affecting environmentally responsible consumption' in the conference "Rethinking Inequalities" 7th Conference of European Sociological Association, at Torun, Poland, on September 9–12, 2005.

problems and transfers from macro-level to individual perceptions causing changes that finally can be observed in changes occurring at the macro-level again (Figure 2).

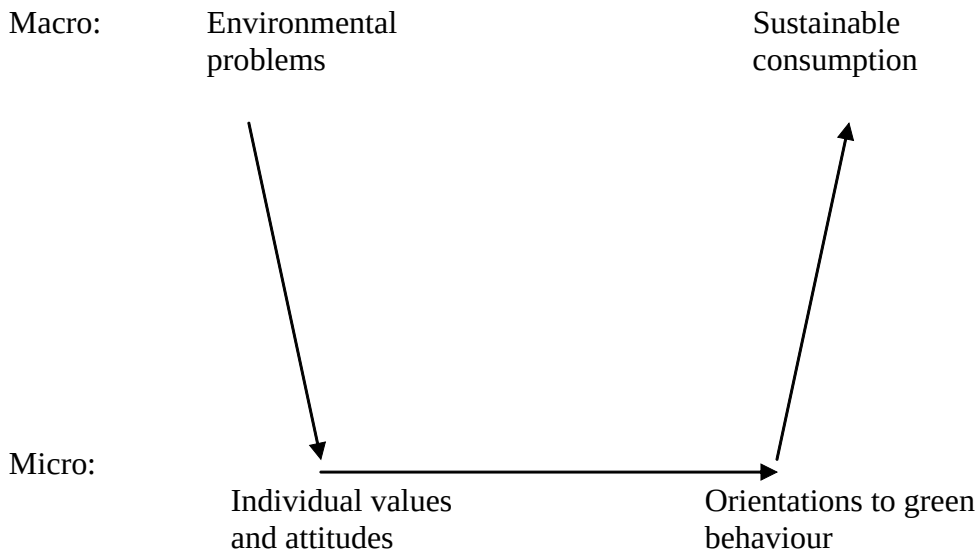

Figure 2: Sustainable consumption according to Coleman's model

In the above mentioned figure there are three transitions. Haanpää explains it as follows:

> The first of these three transitions involves the recognition of environmental problems. The mechanism here works on the principle that environmental changes in development-environment milieus affect formation of individual values and attitudes With an increase in the awareness of environmental problems awareness of people's attitudes and values increases. A macro-to-micro step occurs in this stage. In the second phase occur the micro-to-micro transition, in which individual attitudes and values are strengthened enough to generate new orientations in consumer behaviour. The behaviour becomes greener and more responsible. This case has to do with the individual believer's realization that her or his values and attitudes also imply a change in orientation towards greener practices, followed by action into corresponding behaviour. The last step covers the micro-to-macro transition, which shows how people's interaction with one another generates a collective outcome, that is, sustainable consumption. Several theories could enable to illustrate these specific transformational mechanisms. What the Figures 1 and 2 point out is that sustainable consumption could be flattened into a form of simple figure

and that there exist general laws that explain it. This leads to search for concrete ways to approach transformational mechanism (Haanpää, 2005).

Most Northern countries share a common path to development. They started from a zero point of development and moved towards higher levels of development and modernization in a definite techno-economic sense. Most of them had abundance of natural resources, had experienced comparatively lesser population growth, had the concomitant processes of disenchantment of the world, secularization and human cantered worldview. However, the situation in less developed countries is entirely different. They have a rich culture but a colonial history, shortage of capital but population explosion due to onset of demographic transition, and a desire to catch up with the Western countries. Therefore, when one applies the above model to developing countries a number of issues arise. Firstly, the above model assumes that the environmental issues are objective and external. In actuality the recognition of environmental problems requires that they become part of social representations of lay persons and are objectified and anchored in the cognitive framework of regional population. This presupposes a process of interpretation and reinterpretation. Secondly, in a complex and fragmented society different communities and classes would interpret the environmental problems differently. Thirdly, there is a problem of defining time frame of sustainability: which may vary according to structural and cultural conditions. Lastly, environmental values need not necessarily lead to transformative process by themselves; whether change in values would lead to transformation or not depends heavily on other values, emergence of leadership, collective actors and organizational processes. In the next few paragraphs we try to depict the environmental discourse of India with particular emphasis on water related government policies.

History of water problems and policies of India

Groundwater depletion is the primary threat to drinking water availability in Indiawhich is the only source of nealy 85% of rural population. Protecting drinking water, therefore, entails protecting both sustainable yield and quality of groundwater

(World Bank 1998)[37]. The regulation of groundwater extraction and recharge of groundwater aquifers are considered essential for sustaining rural water supply (GOI 1999)[38]. Groundwater sources free from quality problems are still preferred for drinking water systems because of low cost of O&M (GOK 2000)[39]. A safe groundwater-based drinking water system can be provided in a day or two, as all that is required is a well. Where as in the case of surface sources, water filtering is required which often raises the cost and is time consuming.

Water pollution and decline in water quality is a serious threat to availability of safe drinking water (Iyer 2001)[40]. Water quality problems relate to microbiologic and chemical contamination; the former leads to outbreak of acute diseases, and the latter leads to cumulative and chronic health risks, understood or not-understood. Inadequate sanitation, industrial pollution, and the practice of chemical input-based intensive agriculture affect water quality. Pollution of water caused by industries and release of untreated sewage is widespread in the country (Ramachandraiah 2001)[41]. As water quality status is dependent on quantity as well, quality problems are becoming apparent as water becomes scarce (World Bank 1998b)[42].

Poor sanitation and absence of sewage treatment are important causes of water pollution. Even in a relatively water-abundant state such as Kerala, the availability of safe drinking water is a problem because of lack of sanitation. Nearly 2.9 million of the 5.5 million households in Kerala are estimated not to have safe sanitation facilities. Only 7 percent of the population in Karnataka had access to sanitation facilities in 1990. Though access to sanitation is somewhat higher in urban areas, the method of sewage disposal poses danger to water sources.

[37] World Bank (1998a) India-Water Resources Management Sector Review: Rural water supply and sanitation report, Rural Development Unit.
[38] Government of India (1999a) Annual Report 1998-99 of the Ministry of Rural Areas and Employment. New Delhi: Ministry of Rural Areas and Employment.
[39] Government of Karnataka. (2000) Rural Water Supply and Sanitation in Karnataka: Strategy Paper 2000-2005. Bangalore: Rural Development and Panchayat Raj Department.
[40] Iyer, Ramasamy (2001) Water: Charting a Course for the Future – I. Economic and Political Weekly. Vol. XXXVI, # 13, pp. March 31.
[41] Ramachandraiah C (2001) Drinking water as a fundamental right, EPW, February 24.
[42] World Bank (1998b) India – Water Resources Management Sector Review: Groundwater Regulation and Management Review. Washington, D.C.: The World Bank.

Groundwater sources, which are usually perceived to be safer than surface sources, are also often contaminated. Water from wells in urban areas has been found to be non-potable. Almost 50 percent of the groundwater used in and around Delhi is contaminated with fluoride and nitrates (Down to Earth 1998)[43]. Arsenic contamination in Bangladesh and West Bengal demonstrate the mistake in assuming that groundwater is safe for consumption. Nearly 30 million people are estimated to be at risk in the delta region(Down to Earth 1997)[44]. Although arsenic contamination of water takes place through natural leaching, some have attributed it to over-exploitation of groundwater for irrigation.

The Department of Drinking Water Supply was created in October 1999 to focus attention on the goal of providing safe drinking water to all the rural villages in the next five years, as contained in the National Agenda for Governance of the Government of India (1999).[45] Significantly, the Department of Drinking Water Supply supplements the efforts of the State Governments in providing drinking water and sanitation facilities in the rural habitations by rendering financial assistance under Centrally Sponsored Schemes. There are two sectors under the jurisdiction of the Department *viz*. Drinking Water and Sanitation.

A national water supply and sanitation programme was introduced in the social sector in the year 1954. The Government of India provided assistance to the States to establish special investigation divisions in the Fourth Five Year Plan to carry out identification of the problem villages. Taking into account the magnitude of the problem and to accelerate the pace of coverage of problem villages, the Government of India introduced the Accelerated Rural Water Supply Programme (ARWSP) in 1972-73 to assist the States and the Union territories with 100 per cent grants-in-aid to implement the schemes in such villages. This programme continued till 1973-74. But with the introduction of the Minimum Needs Programme (MNP) during the Fifth Five Year Plan (from 1974-75), ARWSP was withdrawn. The programme was, however, reintroduced in 1977-78 as the progress of supply of safe drinking water to due

[43] Down to Earth. (1998) Why Are We All Falling Ill? Vol 7, No 9 September 30.
[44] Down to Earth (1997) Involving you to change the future : people's water management : [CSE/DTE campaigns supplement], In:, vol. 5, no. 24, May 15, 1997, p. 64).
[45] Rural Water Supply and Sanitation Programme; See: rural.nic.in/anual0203/chap-25.pdf

villages identified with problems, were under the MNP was not adequately focused upon.

The programme was channelized by theTechnology Mission on Drinking Water Management, under the title National Drinking Water Mission (NDWM) was introduced as one of the five missions in 1986. The NDWM was renamed as Rajiv Gandhi National Drinking Water Mission (RGNDWM) in 1991.

The functions of the RGNDWM are summarized as:

(a) Accelerated Rural Water Supply Programme (ARWSP) for supplementing State Governments efforts in providing access to safe drinking water to all rural habitations in the country;

(b) Sector Reform/ Swajaldhara: up to 20 per cent of annual ARWSP allocation is earmarked for institutionalizing community participation in Rural Water Supply Programme.

At present, the following Schemes are being implemented by the Department:

i. Accelerated Rural Water Supply Programme or ARWSP;

ii. Sector Reform Programme, which has been expanded, as the Swajaldhara Programme;

iii. Three Programmes of the Prime Minister; and

iv. Rural Sanitation Programme, which was earlier implemented as Central Rural Sanitation Programme (CRSP) launched in 1986 and subsequently, restructured in 1999. The provision for allocation based component of CRSP has been phased out in 2002. The Total Sanitation Campaign (TSC) under restructured CRSP was launched from 1.4.1999 following community led and people-centric approach.

The Government of India has achieved considerable success in meeting drinking water needs of the rural population over the years. With an investment of more than Rs. 40,000 crore on rural drinking water supply, 91.06 per cent of rural habitations have been fully covered (FC) with drinking water facilities; 7.93 per cent are partially covered (PC)[46].

[46] Source: Department of Drinking Water Supply, Government of India, www. ddws.nic.in

A major shift in approach has taken place in the Water Supply Sector in recent years. Sector Reform approach has been adopted in 67 districts in the country. The core support is supplemented by other support services like social mobilisation, capacity building, Information Education and Communication (IEC), Human Resource Development (HRD) and Management Information System (MIS).

Rural water supply is a State subject. From their own resources, States have been taking up projects and schemes for the provision of safe drinking water. However, recognizing the importance of providing safe drinking water in rural habitations, Government of India has been providing financial assistance to State Governments. State Governments decide upon agencies to be implemented for the programme. The agencies may be the Public Health and Engineering Department (PHED), Rural Development Department or the Panchayati Raj Department. Keeping in view the concept of decentralisation of power, Government of India has delegated powers to States. The State Level Scheme Sanctioning Committee approves all projects and schemes proposed under ARWSP.

It has been historically proved that to strengthen the socioeconomic conditions of rural India, mere administrative decentralization or increased investment is not enough. Strength of people's participation has been recognized and brought to the front. In spite of enhanced investments, and improvement in the rural water supply and increased expenditure by the Government, particularly in the last one-decade, people's satisfaction at the community level is rather limited[47]. The change in technology (earlier emphasis was laid on hand-pumps fitted to tube-wells and bore-wells) had resulted in an impressive increase in the total rural water supply coverage. However, the availability of potable drinking water in rural areas, especially during the summer months, is still not adequate. Government of India recognizes that sustainability of sources and system is key to people's satisfaction. In spite of impressive coverage, systems are falling idle and into disrepair. While this may indicate failure of the governmental machinery, this is also due to the perception of the rural people that water is a social right to be provided by the Government, free of

[47] The second author has found this in a number of studies conducted in different States of India.

cost. Conventional overall governmental responsibility framework excludes the rural mass from their prospective involvement in the O&M of the system at the same time.

The Government has tried to emphasize on the fact that water is an economic and social good and should be treated as such. It needs to be managed at the lowest appropriate with users involved in the planning and implementation of projects. With this aim in view, Government of India has brought about policy changes by introducing reforms in the rural drinking water supply sector. ARWSP was improved in April 1999 to include proposals to mobilise community participation in rural water supply programmes, and 20 per cent of the annual outlay has been earmarked for providing funds for such projects.[48]

Such a shift envisions demand-responsive approach, community participation and decentralization of powers for executing and operating drinking water supply schemes. In this new approach, the government plays the role of a catalyst. Efforts are being made to create awareness through Information Education and Communication (IEC) amongst the people about the need for their effective participation in this programme.

Sector Reform Projects were initiated in 1999-2000 and is being implemented in 67 districts spread out over 26 states on the basis of community participation to the extent of 10 per cent of the capital cost and shouldering entire O&M responsibility by the community. There was always a demand for scaling up of the reform initiatives throughout the country. Moreover, the willing village/ Block in a Panchayati Raj institution that wanted to adopt reform principles within their areas could not do so because sector reform measures were adopted only on a district basis. To meet the expectations of the community and scale up the reforms throughout the country, the Sector Reform Projects were improved and launched as Swajaldhara on 25 December, 2002 so that the reform projects can be taken up in any district of the country.

[48] Indian Reform Initiatives in Water Sector – Keynote address by M. Venkaiah Naidu, Minister for Rural Development, Government of India at World Water Forum, May 6, 2002; available at: ddws.nic.in/MWForum.pdf

Swajaldhara has two components – Swajaldhara I and Swajaldhara II. Swajaldhara I is for a Gram Panchayat/ group of GPs/ Block or Tehsil panchayats while Swajaldhara II has a District as the project area. States can implement both Swajaldhara I and II projects. So the lowest level of PR institution or any Gram Panchayat can opt for reform principles in the drinking water sector and bid for Swajaldhara I project. Though Swajadhara I projects are mostly to be single village schemes, if group of GPs come together there could be multiple village schemes as well provided the community agrees to the basic principles of reform. Specific proposals under Swajaldhara I will be sanctioned by the District Water and Sanitation Committee. The key elements are (i) demand driven and community participation approach; (ii) Panchayats/ communities to plan, implement, operate, maintain and manage all drinking water schemes; (iii) partial capital cost sharing by the communities upfront in cash; (iv) full ownership of drinking water assets with Gram Panchayats; and (V) full O&M by the users/ Panchayats.

Beneficiary Groups, Gram Panchayats and Blocks adopting the reforms principles will be eligible for Swajaldhara Projects. 10% community contribution of the estimated capital cost of the schemes upfront (5% in case of predominantly SC/ST habitations as per 2001 census) will be integral part of the project. The cost of the project excluding community contribution will be fully met by Government of India. After the past and present government policies, we will see the coverage status of India.

Status of National Coverage

The Tenth Plan accorded the highest priority to provide the 'Not Covered' (NC) habitations with sustainable and stipulated supply of drinking water. It was envisaged to cover all the rural habitations including those, which might have been slipped back to NC/PC category by the end of the Tenth Plan. In the rural drinking water sector, the Department of Drinking Water Supply has planned to cover all rural habitations, cover all rural schools and regulate the quality of water. The total amount assessed for this purpose is Rs. 26,000 crore. To cover due rural habitations, assessment has been made based on the Tenth Plan working group.

The status of coverage of habitations as reported by the Department shows that so far about 95 per cent of all the habitations in the country have been covered in the last 50 years. Further, as per the data indicated by the Department, more than Rs. 48,000 crore have been invested since independence by the Central and State Governments and 37 lakh hand pumps, 1,45,000 piped water supply schemes have been installed.[49]

Drinking Water in West Bengal

Our study is focused on a particular state, i.e. West Bengal. Regarding provision of safe drinking water, West Bengal holds the second position, nationally after Punjab (Punjab 92.74 %, West Bengal 81.98%)[50]. Ironically, a survey on water quality reports that in West Bengal approximately 5 million people are drinking arsenic-contaminated water at levels greater than 50 m g/L and that nearly 300,000 people have arsenical skin lesions (Chowdhury et al. 2000)[51]. The survey found that many people in affected villages have elevated arsenic levels in hair, nails and urine even if they do not exhibit arsenical skin lesions.

Depending on the available water resource in a particular area, Public health Engineering Department of the State Government has been striving hard to provide safe drinking water for the people of the State. There are 79036 habitations in rural areas of the State of West Bengal. Presently, there is no habitation in the State without a drinking water supply source. As on 1.4.2002, 65745 of these habitations are fully covered @ 40 lpcd service level. Rest are partially covered i.e. the norms of having at least one source of water supply for 250 persons have not yet been achieved for these partially covered habitations.

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[49] Eleventh Report of the Standing Committee on Rural Development (2004-2005), Fourteenth Lok Sabha, Ministry of Rural Development (Department of Drinking Water Supply), *Presented to Lok Sabha on* 20.4.2005; available at: 164.100.24.208/ls/CommitteeR/rural/11rep.pdf

[50] 10th Plan Document, Government of India.

[51] Ref: Chowdhury UK, Biswas BK, Chowdhury TR, Samanta G, Mandal BK, Basu GC, et al. Environ Health Perspect (2000) 108(5) p393-397.
Source: http://www.waterquality.crc.org.au/HS/hs19lit.htm

According to PHED, Government of West Bengal, Piped Water Supply coverage as on 31.3.2002 is 24.56%, up from 0.7% in 1977. In 1977, there were only 9 commissioned Rural Piped Water Supply Schemes in the plains. Presently, the number of commissioned schemes is 716. When all the 856 sanctioned Piped Water Supply Schemes in plains are completed, the coverage of rural population would reach 33.78%. Zilla Parishads have taken over 56 commissioned Rural Piped Water Supply Schemes for carrying out operation & maintenance. The remaining schemes are still being maintained by the PHE Department (*ibid).* As on 1.11.2004, altogether 79036 habitations are fully covered under rural water supply programme in West Bengal[52].

PHED has already taken initiatives to bring about management of water supply schemes by the users. Sustainability in O& M of already created assets is to be given very high importance. HRD Cell of PHED is working towards this direction, by training the rural people towards water management. The State Government has also submitted Projects to the Central Government on Information, Education and Communication (IEC) campaign in arsenic affected areas (*ibid).*

The aforementioned review of literature suggests an important gap in the existing knowledge that pertains to the socio-economic dimension of water distribution system, i.e., the extent of people's participation in this mega-initiative of the government vis-à-vis their perception about water consumption, harvesting and conservation in general. The stress on water conservation practices is obvious as, 'water conserved is water produced'. This is an important dimension as success of such efforts ultimately depends on people's initiatives as end-users. At the same time exploration of down to earth traditional practices of people related to safe drinking water consumption can also help the government to implement its plans more effectively in the coming years. The proposed study becomes significant under these paradigms.

[52] Eleventh Report of the Standing Committee on Rural Development (2004-2005), Fourteenth Lok Sabha, Ministry of Rural Development (Department of Drinking Water Supply), p*resented to Lok Sabha on* 20.4.2005; available at: 164.100.24.208/ls/CommitteeR/rural/11rep.pdf

Methodology

In this study, both quantitative and qualitative methods have been used. For measuring GEB and SEB five point Likert scale will be used. Apart from the attitudinal scale, information regarding demographic and social variables is also be taken into account. In West Bengal, 3285 villages in 85 blocks of nine districts (North 24 Parganas, South 24 Parganas, Kolkata, Hoogly, Howrah, Nadia, Bardhaman, Murshidabad and Malda) are affected by arsenic pollution in groundwater resources[53]. Since 1997, over 135 well-head arsenic removal units have been installed in remote villages in the Indian state of West Bengal bordering Bangladesh[54]. Most of the units are concentrated in North 24 Parganas. Therefore, we have selected North 24 Parganas district for the purpose of the present study. In this district, out of 20 blocks 16 are affected by groundwater arsenic contamination. From this district we have selected Gaighata block. There are 54 arsenic affected villages in this block, which is the highest in the district[55]. The block is located near the border of Bangladesh and has good communication with city and there are different NGOs working in this area.

Purulia, another district in West Bengal, is located in the western part near Jharkhand border. This arid zone district has 14 blocks and overall water availability is very poor. We have selected Bagmundi block, which is practically devoid of ground water availability except few dug wells at hilly villages and few bore wells for domestic uses. The reason behind this selection is to explore peoples' understanding of the importance of water resources and their consumption practices in a water-scarce area vis-à-vis alluvial North 24 Parganas. As the prosed study is comparative in nature, above-mentioned districts have been selected to understand and compare the environmental beliefs and practices regarding sustainable water consumption.

[53] As per 17 years ongoing study of School of Environmental Studies, Jadavpur University; For more information see http://www.soesju.org/

[54] S. Sarkar et al. (2005) Well-Head Arsenic Removal Units in Remote Villages of Indian Subcontinent: Field Results and Performance Evaluation. *Water Research*, 39, 2196–2206

[55] http://north24parganas.nic.in/publichealth.html

As mentioned earlier, the districts and the blocks are selected purposively. From each block, four villages are selected. In case of Gaighata in North 24 Parganas, two villages are chosen that have available arsenic free tube wells and other two villages, without then. On the other hand, from Bagmundi block two villages are selected which have a relatively better water availability in comparison with the two other villages. Then, from the each selected village 35-40 respondents are chosen randomly. Household list and voters list may be used as sampling frame. After the final review of over 300 schedules we have selected 287 completed schedules for further analysis.

As mentioned earlier combination of both qualitative and quantitative approaches is used for data collection. In course of quantitative investigation, semi-structured interview schedule is used for household survey. The schedule is mainly divided into two parts. In the first part (Part A), household level information is obtained by interviewing the head of the household. It includes socio-demographic characteristics regarding the members of the household, i.e. their age, sex, marital status, educational level and occupational pattern besides others. The second part (Part B) of the schedule is broadly divided into four parts covering questions in the following areas.

a) Sources and uses of water
b) Health and illness
c) Awareness, participation and other social issue
d) GEB and SEB (using five point Likert type scale)

Qualitative approach is used to understand the underlying cause of pro-and-anti- environmental behaviour. Ten (five from each district) case studies are conducted for a better understanding of familial and social issues relating to water consumption as well as conservation behaviour. A Few focus group discussions (FGDs) are conducted with the housewives to understand their perception on these issues. In-depth interviews are carried out with rural water supply officials at each block level to know about the initiatives taken so far at the government level to tackle the problem. The plans and programmes for the safe and sufficient drinking water to the community are also explored. In-depth interviews are done with community

leaders and Panchayat officials to capture their understanding and expectation regarding the problem. For this paper the concentrated analysis focuses on the NEP scale.

Major findings

The analysis of the data collected in this study is not completed. This paper analyses only the data on general and specific attitudes towards environment, and the qualitative data on culture, social representations and practices. The means and standard deviations of attitude items are computed separately for the two types of villages, i.e., those suffering from arsenic pollution and those facing shortage of water. To place the findings in some perspective, a few findings regarding the socio-economic background of the respondents may be of use.

Background characteristics

As compared to the Western standards the people in the villages of West Bengal are poorer, lacking in environment networks, and are tradition bound. They survive on agriculture and animal husbandry and in need many of them, particularly those belonging to the poorer sections migrate to neighboring districts for employment. The salient features of the background of the respondents are as follows:

- 67.1 percent of the respondents are males.
- 20.6 percent of all the respondents belong to below poverty line (BPL) households as per the official status
- 95.8 percent respondents have monthly income below Rs. 5000 (i.e., 100 US dollars)
- Less than 60 percent households had two members with schooling above four years
- 65 percent households had only one earning member
- 74.2 percent households get drinking water throughout the year
- 61.7 percent households get inadequate quantity of water
- 72.5 percent households use the public source of water

Table 1: Means and SDs of the scores on the items on general and specific environmental beliefs scales for the two types of villages

Statements(GEB)	Arsenic villages			Water deficit villages			All villages			
	Mean	N	SD	Mean	N	SD	Mean	N	SD	t- value
We are approaching the limit of the number of people the earth can support (*within limited supply of natural resources such as land, water air etc.*)	4.5	160	0.73	3.23	127	0.59	3.94	287	0.92	16.29871
Humans have the right to modify the natural environment to suit their needs	1.8	160	0.8	2.76	127	0.67	2.23	287	0.89	-11.0596
When human interference with nature it often leads to disastrous consequences	2.6	160	1.16	3.28	127	0.68	2.9	287	1.03	-6.19439
Human ingenuity will insure that we do NOT make the earth unlivable. (*They will always be able to make newer discoveries to solve emergent problems of existence)*	3.53	160	1.13	3.51	127	0.76	3.52	287	0.99	0.178681
Human are severely abusing the environment	3.94	160	0.92	3.5	127	0.8	3.75	287	0.89	4.329281
The earth has plenty of natural resources if we just learn how to develop them	1.86	160	0.77	2.38	127	0.79	2.09	287	0.82	-5.60086
Plants and animals have as much right as human to exist	4.93	160	0.26	4.06	127	0.91	4.54	287	0.76	10.44111
Balance of nature is strong enough to cope with the impacts of modern industrial nations *(such as England or America)*	2.93	160	0.74	3	127	0.25	2.96	287	0.58	-1.1188
Despite our special abilities humans are still subject to the laws of nature	4.14	160	0.95	3.26	127	0.63	3.75	287	0.93	9.399102
The so-called “ecological crisis” facing by humankind has been greatly exaggerated	3.48	160	0.74	2.95	127	0.42	3.24	287	0.67	7.640762
The earth is a spaceship with very limited rooms and resources *(such as water, land and other natural resources)*	2.43	160	0.95	3.02	127	0.28	2.69	287	0.79	-7.45823
Humans were meant to rule over the rest of the nature	3.61	160	1.03	2.7	127	0.73	3.21	287	1.02	8.74568
The balance of nature is very delicate and easily upset	2.93	160	1.33	3.12	127	0.45	3.01	287	1.04	-1.6893
Human will eventually learn enough about how nature works to be able to control it	3.54	160	1.01	2.46	127	0.81	3.06	287	1.07	10.05281
If things continue with there present course, we will soon experience a major ecological catastrophe	2.99	160	1.44	3.32	127	0.97	3.14	287	1.26	-2.31224
Statements(SEB)										
There is enough water in our village	1.54	160	0.78	3.75	127	1.11	2.52	287	1.45	-19.0178
Water is the cheapest natural resource. That is why the government should charge no cost	2.23	160	1.25	2.58	127	0.71	2.38	287	1.06	-2.98645
Science surely will solve the problem of water scarcity	3.48	160	0.78	3.72	127	0.99	3.59	287	0.89	-2.23609
Drinkable water is an unlimited resource	2.2	160	1.07	3.61	127	1.2	2.83	287	1.33	-10.3681
Water scarcity is a lie produced by politicians	3.64	160	1.1	2.8	127	0.63	3.26	287	1.01	8.125259
Humans have the right to use all the water they want because they are the kings of Creation	2.08	160	1.25	2.27	127	0.79	2.16	287	1.08	-1.56817
Drinkable water will exhaust very soon if we do not save it	4	160	0.94	3.69	127	0.79	3.86	287	0.89	3.034455
A way of preventing water exhaustion is using it when absolutely necessary	2.48	160	1.35	4.07	127	0.89	3.18	287	1.41	-11.9757

Environmental beliefs

Table 1 shows the Means and standard deviations (SDs) of scores on items on general and specific environmental beliefs scales for the two types of villages. As such the scale contained some positive and some negative statements. They have been scored in such a manner that for each item a higher value of score is indicative of stronger and pro-environmental belief. It also exhibits the means and SDs for each item for the combined sample. To compare the means of the two sets of villages t-statistic has been calculated.

The above table shows that in general people are strongly pro-environment. Mostly, the mean value of the score is above 3 (on 1-5 scale). Yet there are observable variations in scores between different groups of villages –some facing arsenic risk and some shortage of water - as well as within villages. Further analysis would reveal the sources of these variations.

It is interesting to note that in case of general environmental beliefs (GEP) the respondents from arsenic and water deficit villages differ significantly on 12 out of 15 dimensions. It is equally interesting to note that in a greater number of cases arsenic villages show greater pro-environmental beliefs than in the water deficit villages. Contrary to researchers' expectations that arsenic is an invisible risk, analysis shows that it is a far stronger threat compared to the visible problem of water shortage. This can be attributed partly to people's own experiences and partly to activities of the government and civil society. In case of specific environmental beliefs the respondents from the two types of villages differ significantly on 7 out of 8 dimensions. To substantiate these quantitative results, due qualitative results based on FGD and in-depth interviews, mostly from arsenic affected villages are further discussed.

Subject assessments of risk, responses and stigmas related to arsenic consumption

From the FGD it came out that people know that water contamination is something, which endangers their life. They also added that arsenic contamination in groundwater is a hazard, which risks their social life. A 23 years old male replied that in their family most of the members suffer from skin problems and this is because of drinking water but people interpret it as though if they come close to the person, his problems can spread to them also. He said, "What can I do now? I'm very upset about the social exclusion that I have been experiencing after getting this skin lesion. Everybody in this village treats me with disdain." When asked about the risk associated with his drinking water consumption, he replied, "Two of my family members have died in the last four years. I know the risk very well. We don't have money. What can I do? I have to drink otherwise I will die within a week instead of years." It is clear from the discussion that people are very much worried regarding their health, however, they don't have much to do on their part. In some areas they have to consume this contaminated water.

The most common effects of arsenic include gradual loss of strength, diarrhea or constipation, pigmentation and scaling of the skin, nervous system manifestations marked by paralysis and confusion, degeneration of faulty tissues, anaemia, and the development of characteristic streaks across fingernails. A number of internal cancers (lung, bladder, liver, prostate, and kidney cancer) are also believed to be linked with chronic arsenic toxicity. However, it may take two to twenty years for a person exposed to arsenic to develop the symptoms of *arsenicosis*, the name by which the disease is known[56]. In the 2002 report of WHO *arsenicosis* is defined as "a chronic health condition arising from prolonged ingestion (not less than six months) of arsenic above a safe dose, usually manifested by characteristics skin lesions, with or without involvement of internal organs"[57]. The period differs from patient to patient depending on the amount of arsenic ingested, nutritional status of the person,

[56] *The International Workshop on Arsenic Mitigation in Bangladesh*, January 2002, has defined arsenicosis as "a chronic condition due to prolonged exposure of arsenic above safe level usually manifested by characteristic skin lesions with or without involvement of internal organs and malignancies."

[57] http://w3.whosea.org/LinkFiles/Arsenic_Mitigation_Arsenicosis_case-detection_management_and_surveillance.pdf

immunity level of the individual, and the total time period of arsenic ingestion[58]. While the early symptoms of *arsenicosis* can be treated, many of the more advanced and most serious clinical symptoms are incurable. However, most of the people in the study area think that this disease is incurable which generates social and institutional complications. It is evident from the FGDs that the knowledge of the local people regarding the risk is very poor. People may or may not be affected by disease but they are reluctant to accept proper knowledge regarding this. For last few years some awareness campaigns have been carried out in one of the Gram Panchayats but the participation of the people is very poor. A 55 years old farmer said, "Sometimes people come and say something about arsenic but I don't have time to hear as I have lot of work to do". Basanti Roy, a NGO personnel in Rampur village said, "We try to organize meetings but people do not come. Most of the time patients come to the meetings and ask for remedial measures and drugs. We just say them that we are not able to cure your problem, for this you have to go to the doctor. But people go to the doctors only when the situation crossed fatal limit".

The response of the educated persons is mixed. There are prejudices and misconceptions. Kishore Majumdar, a petite businessman in Rajapur village said, "You see, we are old residents of this place. Earlier we did not have any problem with our drinking water. We had tube well in our house compound. Now-a-days lots of people are coming from Bangladesh and I think they are carrying this disease with them. People will think I'm blaming them but if you search, you can find most of the patients are Bangladesi refugees". At this point of discussion Narandranath Halder, a 60 year old person interrupted him and said, "You people are fool. Although I'm educated up to Matric (10^{th} standard) I know better than you. This disease has nothing to do with particular people. In past, we have used so much water indiscriminately and as a result of that today we are drinking this poison". In this group no one is a patient of *arsenicosis.*

In another group consisting of female members from the village Rampur a *arsenicosis* patient said, "I don't have any pain in my body, but my hands and feet

[58] Rahman Quamruzzaman and Asad, "Effects of Arsenic on Health," in *The Report of the Specialized Course on Arsenic Contamination in Bangladesh* (Dhaka: International Training Network Centre [ITN] Bangladesh, May 1823, 2002).

have a few black spots. I've gone to the local health centre and they said that this has occurred due to arsenic". From the discussion it was identified that most of the patients don't have any particular physical problem in the early stages of the disease. Even sometimes they were unaware about their disease.

Different agencies reported that if the disease is diagnosed in early stage it can be cured provided the patients do not drink again contaminated water afterwards (Chowdhury et al., 2000)[59]. From the present study it was found that after implementation of piped water supply by the department of public health engineering the prevalence of the disease became lower. Interestingly, a peculiar consumption pattern has been found in these areas. People get water only four hours a day (in morning two hours and in evening another two). Most of the people never turn off the tap after use. Not only that, in another villages most of the stop corks have been removed.

Lack of knowledge on the part of villagers as to the presence of arsenic in well water or its health affects has sometimes resulted in the stigmatization and ostracization of some community members with visible symptoms. Not only Bangladeshi migrants are blamed, women too are stigmatized. Some women are unable to marry at all and few of them have been rejected by husbands. Children are kept out of school as parents attempt to hide their symptoms.

Sometimes villagers are reluctant to stop using tube well water once they have been told it is contaminated, because the wells are associated with kinship networks or are status symbols of wealth and prosperity. The delay in manifestation of symptoms and the variations in health effects on different drinkers of the same well also lessen the villagers' sense of need to move away from the consumption of contaminated water[60].

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[59] Chowdhury UK, Biswas BK, Chowdhury TR, Samanta, G, Mandal BK, Basu GC, Chanda CR, Lodh D, Saha KC, Mukherjee S., Roy S, Kabir S, Quamruzzaman Q, Chakraborti D. (2000), Groundwater Arsenic contamination in Bangladesh and West Bengal, India. *Environmental Health Perspectives*, 108:5, 393-397.

[60] Bearak, Barry (1998) *New Bangladesh Disaster: Wells that Pump Poison.* http://www.dainichi-consul.co.jp/english/arsenic/nytimes.htm, last accessed 05/09/00.

In rural society ostracism is a great problem associated with any kind of contagious disease. Sometimes the disease may not be contagious but people still avoid patients like leprosy and other overtly skin diseases patient. In neighbouring Bangladesh these is a great social problem. If disease appears anywhere in rural Bangladesh, there is a tendency for people of that area to avoid and to isolate the affected people (Tsutsumi et al., 2004; Withington et al., 2003)[61]. Awareness is of very low and people's attitude is very orthodox kind in this respect. With illegal labor migration across national borders such ideas are bound to flow to Indian side also.

The vast majority of the rural people are inextricably dependent on the contaminated water for their daily survival. Most of these people are illiterate and ignorant of arsenic. So, they neither understand the process of arsenic contamination, nor the future impact of the catastrophe of arsenicosis. Women are the worst victims of ostracism. Women have to take the main responsibilities to perform domestic roles. They are doubly vulnerable both because of the disease itself and by being treated as outcasts. For instance, Renu, an arsenic-affected patient of 20 years of age, lives with her parents in Rajapur village of Fulsara Gram Panchayat. She discontinued education due to her skin problem. Her whole family drinks water from arsenic-contaminated tube wells located there. She had heard some discussion of arsenic from local NGO but did not attach any importance to it since she knew nothing about the subject. She is affected with arsenicosis, having had black spots on her feet and hands for 3 years. She illustrates "I have gone to the local physicians several times for treatment and taken medicines and used ointments as per their prescriptions, but I could not find any improvement". She also added that she loves a person and had good relationship with her, however when her fiancé came to know that she was suffering from skin diseases related to arsenic, he has started to avoid her. For Jayanti Das, a 32 years old housewife, the story is more or less similar. She even faces more vulnerable situation in her life. Her husband left her and she is facing critical situation with three small children. She laments "Nobody has given me a job when I asked for work. Few days back only I came in contact of a few NGO persons who helped me a lot. They

[61] Tsutsumi, A., Izutsu, T., Islam, M. D. A., Amed, J. U., Nakahara, S., Takagi, F., & Wakai, S. (2004). Depressive status of leprosy patients in Bangladesh: Association with self-perception of stigma. *Leprosy Review*, 75(1), 57–66.
Withington, S. G., Joha, S., Baird, D., Brink, M., & Brink, J. (2003). Assessing socio-economic factors in relation to stigmatization, impairment status, and selection for socioeconomic rehabilitation: A 1-year cohort of new leprosy cases in north Bangladesh. *Leprosy Review*, 74(2), 120–132.

supplied the medicine totally free of cost and now I drink water from a different tube well which is recently done by government (Department of Public Health Engineering). Presently, I am working in a house as maid servant". Farmers, particularly daily wage labourers are the victims of the ill health effects of arsenic poisoning.

Apart from the patients the non-afflicted persons also have peculiar attitude towards patients and the disease. It was clear from the responses from key informants (educated males and Panchayat officials). Ramsankar Biswas, a clerk at government office says "We know that *arsenicosis* is not contagious and it happens after consuming contaminated water but you know there are social taboos. If I started to interact with this kind of people others will classify me as a deviant and that will dampen my social status".

In conclusion, it can be said that people with arsenic are prone to social ostracism and stigmatization. Sometimes their family members also suffer from mental trauma in their neighbourhood. Arsenic patients are often identified as leprosy patients and so are ostracized unkindly by society. The victims are abandoned not only by society also by their family members and relatives. Children of arsenic patients are not allowed to attend social and religious functions.

Arsenic is giving birth to extreme instability in the social life. In many areas arsenic free drinking water is quite unavailable and due to ill maintenance the old tube wells are not also working. People are getting dejected without having proper treatment. People are ignorant of what arsenic is or why they are getting sick out of drinking water from tube well. As a result, a chaotic environment is prevailing in the areas. Socialization of a child is being greatly hampered by the problem of arsenicosis. The fear of becoming a victim of arsenicosis is acting as a barrier towards the proper psychological and physical development of a child. arsenicosis is creating social stigmatization and discrimination. Consequently, social harmony and network relationships are being destroyed, resulting in social conflicts and other serious problems.

In addition, the use of tube well water in India has become very popular among rural people, owing to a cumulative effort and continuous campaign of 25 - 30 years in that direction from government and NGOs. As the practice is deep-rooted, it is therefore extremely difficult to shift people's habit of using arsenic-contaminated sources to using arsenic-free sources. Besides that most of the time the problem of poverty overlaps the problem of arsenic. Respondents are more interested to express their problem of employment, education and in family problems. Sometimes this may be hindrance to extract relevant data from the discussion.

The above analysis shows that in West Bengal the subjective conceptualization of sustainable consumption is fraught with other cultural concepts, lived experiences of people and choices. Basically, the people are not looking for the maximum levels of consumption that can be sustained but they are looking for survival strategies with which they can play their social roles in risk environment. Since they do not understand the mechanisms through which arsenic pollution affects their health and through which the health problems can be mitigated they often respond in ways, which would appear to be irrational and prejudiced to outsiders, but look rational from their perspective. Here the government and civil society actors can help them by providing technical solutions to the water problem as well as by providing scientific explanations of health problems and rational alternatives. In their context, sustainable consumption of water would imply that they get minimal required quantity of drinking water throughout the year and enough water of acceptable quality to meet their other domestic and agricultural needs. .

Some lessons for environmental sociology for India

This study shows several things: (a) in general, people have strong pro-environmental beliefs; (b) beliefs are dependent on the nature of risk as well as various types of flow of ideas and resources, some with conflicting message; (c) the relationship between ideas regarding environment and action is not simple and it is mediated by culture, flows of ideas and resources, structural factors and gender; and (d) in the context of developing societies the emphasis has not to be on sustainable consumerism but on 'sustainable survivalism'. After summarizing the findings Figure 3 presents a slightly modified Coleman's model to understand sustainability issues in both micro and macro level in the context of study region.

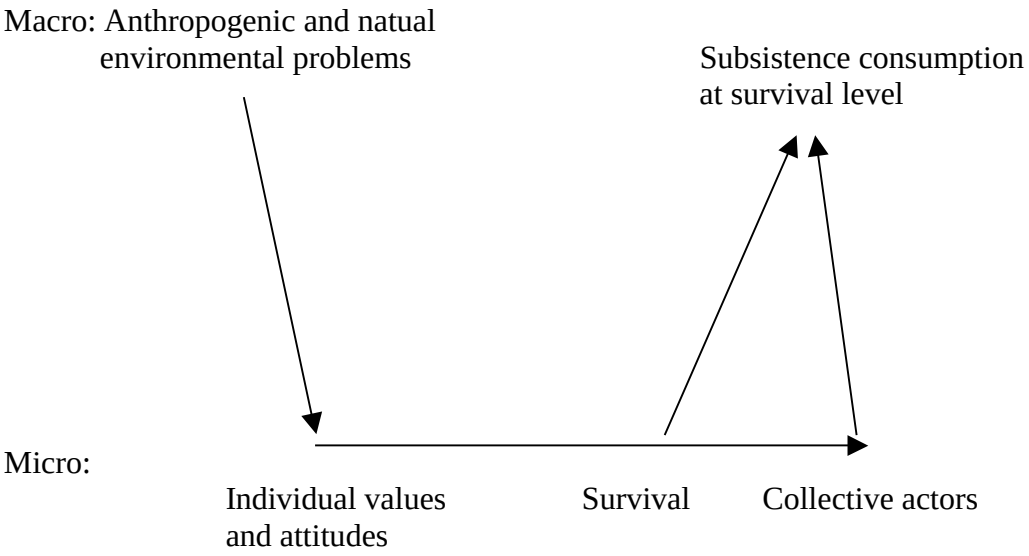

Figure 3: Modified Coleman's model

Conclusion

This study shows that the environmental issues are complex and there is no simple connection between environmental problems and transformative actions. This requires a modification in Coleman's model. Lots of structural and cultural factors are important to understand interpretation of risks, which need to be seen in the perspective of social construction. This study also shows that in the less developed countries survival is a major value and it de-emphasises sustainable consumerism. In the West, sociology of consumerism has developed from two main sources: need to maintain high levels of consumption standards and effectiveness of group action over individual action. In rural India most people are living at survival level. Environmental problems as understood by them cause tremendous anxiety in their mind. Their reactions are determined by the flows of humans and ideas - national as well as international – and are individual. In this context, one needs an integrated approach that combines communication and education with attack on poverty and various forms of injustices in society sustaining on ignorance and tradition. Both government and civil society actors would have to play a role in defining sustainable resource use which will be far below the standards prevailing in the developed countries and in infrastructure and educational activities.