Factors That Mediate Implementation Of Integrated Water Resources Management: Evidence From The Rhine Basin

Medema, W.* & Jeffrey, P.

Key words: IWRM; water resources management; sustainability; theory; practical implementation; mediating factors

Abstract

Different approaches have been developed and proposed to deal with the increasing complexity of challenges associated with water resources management with the ambition of ensuring a sustainable use of the resource. One widely publicised example of such approaches is Integrated Water Resources Management (IWRM). The IWRM concept has a history reaching back several decades but despite that it has been facing difficulties in its transfer from theory into practice and there is a clear need to look in more detail at the process of transforming theory into practice for IWRM and investigate the factors that mediate this process. This study analyses the (historic) implementation of IWRM in a representative case study basin: the Rhine, through semi-structured interviews with a number of key stakeholders. The findings of this study indicate that there are different types of factors and dynamics that influence the theory to practice process for IWRM.

Introduction

It has been recognised by various scholars (e.g. Wurbs, 1998; Simonovic, 2000; Matondo, 2002) that the complexity of water resources management problems is increasing due to the interactions between different factors such as population growth, climate variability and uncertainty, regulatory requirements, project planning horizons, the need to integrate across temporal and spatial scales, socio and environmental considerations, and trans-

* Centre for Water Science, Cranfield University, UK

boundary considerations. Different approaches have been developed and proposed to deal with this complexity with the ambition of ensuring a sustainable use of the resource. One widely publicised example of such approaches is Integrated Water Resources Management (IWRM).

The main objective of IWRM has been described as finding the right balance between protection of the resource while meeting social and ecological needs and promoting economic development (Odendaal 2002). Although the IWRM concept has a history reaching back several decades, it still faces difficulties in its transfer from theory into practice (Biswas, 2005, Jeffrey & Geary, 2006). It has been noted that *there is still a long way to go to achieve a common understanding of IWRM and to develop and refine approaches for its successful implementation* (Jonker, 2002: 719). The GWP/TAC (2000) identifies several questions with regard to IWRM implementation that need to be further addressed, such as: *how is IWRM to be implemented? What has to be integrated and how is it best done? Can the broad principles of IWRM be put into practice – and, if so, how?*

The IWRM approach has received increasing international attention in recent decades, however, contemporary IWRM initiatives rarely consider previous integration attempts. Lessons from past initiatives are vital to more effective implementation of IWRM principles and policies. There is a clear need to look in more detail at the process of transforming theory into practice for IWRM and investigate the different factors that mediate this process. This paper aims to investigate in more detail the process of transforming IWRM theory into practice and to give greater insight into the factors and dynamics that mediate the implementation of IWRM theory through empirical evidence from the design of IWRM planning and implementation.

A Conceptual Model Of The Theory To Practice Process

There have been debates about the linkages and dynamics between theory and practice for centuries, but in the context of management practice, it is only recently that the academic literature has started to investigate this. Tensaki and Hay (2004) state that such investigations have not been undertaken systematically and have not provided much reference to the processes and the sequence of activities entailed in creating such linkages. According to Burgess (2003) it is crucial to become aware of the reasons for

the fundamental incoherency between theory and practice. In other words, to understand what constitutes theory and what constitutes practice as well as what exactly constitutes their bridging linkages. For example, from a scientific perspective, to develop and improve theory, it is crucial to understand how things work in practice (Argyris and Schon, 1978; Tardino et al., 2002). Bingman and Smith (2001) observe that much traditional research does little to stimulate thinking and facilitate action, and instead ends with a written product when the felt or expressed need is for strategy, technique, and actionable ideas. Driver (1985) refers to this as the 'user gap'.

The great divide between theory and practice continues to characterize most of the history of academic knowledge production (Rynes et al., 2001). In order to understand the process and the dynamics between theory and practice, it is necessary to investigate the nature of the linkages between them. The research reported in this paper aims to investigate in more detail the process of transforming IWRM theory into practice. The overall aim of the study reported here is to identify and characterise the factors which mediate the transfer of IWRM from theory into practice. The research approach is to analyse the (historic) implementation of IWRM in a representative case study basin. A conceptual process model (see Figure 1 below) has been developed to detail the dynamics which characterise the transfer of IWRM from theory into practice. This model has formed the basis for development of the research question and methods.

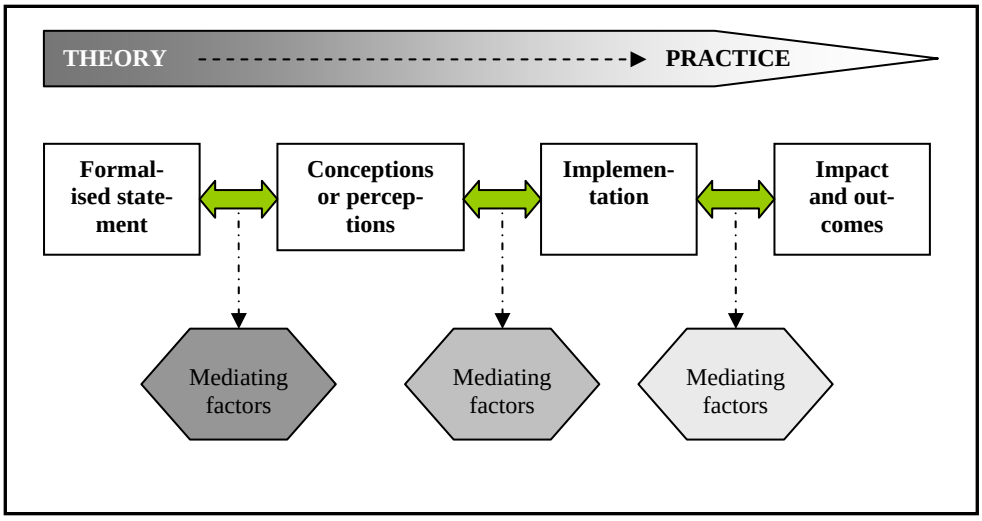

Figure 1: Conceptual model of theory to practice process

The four elements of the conceptual model are described in more detail below:

1. *Formalised statement:* formal or official definition or description of a certain theory or concept as found in contemporary and relevant literature;
2. *Conceptions or perceptions:* the way the theory is perceived or conceptualised by users of this theory;
3. *Implementation:* how the theory is translated into objectives, plans, actions and interventions;
4. *Impact:* the realised impact and outcomes of the actions and interventions that are anchored in and based on the theory.

The focus of this study has been on the linking dynamics between the second, third and fourth element of the above described model and the following research question has been developed on the basis of this model and the research focus: what are the experienced barriers and enabling factors for planning, implementation and realisation of desired ambitions of IWRM interventions?

Research Method

As outlined above, this study investigates the (historical) process of of IWRM theory implementation and the epistemological premise that has been assumed is that of an interpretative, qualitative perspective. The adopted ontological position is phenomenological; a research approach that can be described as a study of phenomena and that is concerned with the experiential underpinnings of knowledge (Husserl, 1970). Phenomenological research can be described as a qualitative research approach in which *the researcher identifies the 'essence' of human experiences concerning a phenomenon, as described by participants in a* (case) *study*' (Creswell, 2003: 15). Eisenhardt and Graebner (2007: 25) describe a case study as containing of *rich empirical descriptions of particular instances of a phenomenon* and building theory from case studies is a research strategy that involves using one or more cases to create theoretical constructs, propositions and/or midrange theory from case-based, empirical evidence (Eisenhardt, 1989).

Case study selection was informed by the need to explore a context with an extensive history of IWRM practice. The Rhine basin was identified as a suitable candidate because it has a longstanding example of partnerships

between the Rhine states with a clear aspiration to follow an integrated approach to reduce pollution and bring the salmon back into the river. The study has focused mostly on experiences in the Netherlands while taking into account transboundary issues. The 'phenomena' and 'lived experiences' that are studied within the Rhine comprise the historical pathways and factors that mediate the implementation of IWRM as they have been experienced by those involved in planning and implementing IWRM in the catchment. Besides aiming to understand the 'lived experiences', we also want to derive a more general, abstract theory of the process, actions and interactions grounded in the views of the participants of the study.

A snowball sampling approach was adopted starting with a number of key respondents involved in the implementation of IWRM in the Rhine. This process led to the final selection of ten interviewees with extensive experience of the IWRM process within the Netherlands as well as on an international level through involvement in the International Commission for the Protection of the Rhine (ICPR).

The case study investigation was executed through semi-structured interviews. Conducting interviews is about finding out what people do, know, think, feel or experience (Robson, 2002; Brenner *et al.*, 1985; Drever, 1995) by asking them, and thereby developing an understanding about the distinctions between the people involved (Brenner et al., 1985). The semi-structured interviews lasted on average one-and-a-half hours each and were transcribed verbatim. A systematic data analysis process has been conducted to manage, extract, compare, explore, and reassemble meaningful pieces from the interview data in a systematic way.

Data Analysis Steps

In the case of this study, we are dealing with qualitative data in the form of interview transcriptions which can be analyzed using qualitative and / or quantitative data analysis methods. Interpretive studies of texts are methods of analyzing qualitative data where the researcher focuses on and names themes or categories in texts, and finally makes an interpretation or draws conclusions about their meaning on an individual or case-specific as well as on a more theoretical level (Wolcott, 1994). Nowadays, many analysis methods, quantitative as well as qualitative, involve visualization of data in order to show patterns that have emerged in the form of maps, networks or matrices (Bernard, 1994).

The basis for the analysis of data for this study is qualitative content analysis, which is defined as "an analysis approach that is supported by the use of empirical methodology to make inferences from text to other states or properties following step by step models" (Krippendorf 1969; Mayring, 2000). Analyzing text involves several tasks: (1) discovering themes and sub themes, (2) winnowing themes to a manageable few, (3) building hierarchies of the themes and (4) linking themes into theoretical models (Ryan & Bernard, 2003). The following steps have guided the process of analyzing data.

Evaluating mediating factors

The conducted semi-structured interviews aimed at identifying the factors - barriers and enabling factors - that mediate the planning and implementation of IWRM as well as the realisation of desired ambitions of IWRM. For this study barriers are described as those factors that have hindered or stopped the implementation process of IWRM, whereas enabling factors are those factors that have facilitated and enabled it.

Looking for themes in the transcriptions initially involved reading and re-reading the transcriptions and marking them up to identify the mediating factors highlighted by the respondents. Some of the most obvious themes in a corpus of data are those *topics that occur and reoccur* (Bogdan and Taylor 1975:83) or are *recurring regularities* (Guba & Lincoln, 1994). These different themes or categories of mediating factor have been summarized in a matrix that orders the mediating factors from most to least frequently mentioned. This matrix gives an oversight of the domain of phenomena as described by the different respondents at the moment of the interviews (Dewulf *et al.*, 2004). Every column corresponds to one or more statements made by the different respondents. More detailed information about the context in which this list of mediating factors take place will be elaborated upon in the results section.

With this method, the aim has not only been the charting of frequency or intensity of certain phenomena throughout the study, but also at developing a deeper understanding of them. Output should allow us to understand the major phenomena and factors that have been experienced by actors during the implementation process. It should be noted that an empty cell in the table does not necessarily indicate that that aspect has not been considered by the respondent. However, it does indicate that the respondent has not considered that factor as particularly influential.

Dynamics between mediating factors

The answers of the respondents with regard to the mediating factors for implementation of IWRM will be further investigated by evaluating the cause and effect relations between the different mediating factors using a cognitive mapping technique termed 'pathway analysis'. Lemon *et al.* (2004) propose this technique as a tool for reconstructing respondents' experiences of a process in a comparable way, representing these processes as pathway diagrams where causes and effects are linked.

Results

During the interviews, respondents were asked to identify mediating factors that have influenced the implementation process of IWRM in the context of the Rhine. The different mediating factors for the implementation of IWRM in the context of the Rhine have been summarized in the matrix below (see Table 2) and are explained in more detail in this section.

The matrix shows all of the respondents numbered from R01 to R10 as well as the mediating factors that they have discussed during the interviews. Each row indicates which mediating factor has been emphasized and elaborated upon by each specific respondent and the bottom of the matrix shows the amount of respondents that have identified and acknowledged this specific mediating factor as influential for the implementation of IWRM. The information in the matrix gives an indication on how influential the mediating factors have been during the implementation of IWRM according to the experiences and perceptions of the respondents.

	Planning & implementation process					Institutional and legal context					
	Resistance or openness to change	Level of integrity of stakeholder process	Strong leadership & vision	Differing levels of trust	Limited sense of ownership	Complexity of structures	Limited power of ICPR & limited accountability of member states	Sense of urgency & awareness	Lack of clarity of roles & mandates	Information access & availability	Prevailing social & economic interests
R01	x	x	x			x	x	x			x
R02	x	x	x	x	x				x	x	
R03	x	x			x	x	x	x	x		x
R04	x	x				x			x	x	
R05	x	x	x	x		x	x	x	x	x	
R06	x	x				x	x				
R07	x	x	x			x	x	x			
R08	x	x	x	x		x	x	x		x	
R09	x	x	x			x	x	x			
R10	x	x	x	x		x	x	x	x		x
Freq.	10	10	7	4	2	9	8	7	5	4	3

Table 2: Mediating factors as identified by respondents

The identified mediating factors that affect the planning and implementation of IWRM interventions as well as the realisation of its goals and benefits are described in more detail below:

Resistance or openness to change

The IWRM implementation process is described by all respondents as 'people-work' involving mainly human activities. Therefore, all respondents emphasize the importance of openness to change of the different

players involved. When people hold on to their old views and to how things were in the past, resistance to change will be high. Many stakeholders still see change as a threat. Many of the other mediating factors, such as: institutional structures and complexity; types of leadership; communication & information; as well as the integrity of stakeholder processes will influence the openness or resistance to change. The sense of urgency and increasing environmental awareness can cause great shifts in resistance to change mostly on political but also on public levels.

Level of integrity of stakeholder process

In the context of the Rhine, a diversity of stakeholders is involved in the planning processes. For the implementation of measures support is needed from different important players, those with power to influence the process and arguably those that are affected by the process. This involvement of different types of players throughout the planning process is important to generate acceptance and develop a support base for the implementation of actions and interventions. Some of the respondents state that there are issues with regard to questions as to whom to involve as well as how to deal with hesitance to follow collaborative approaches. When a large number of stakeholders with different interests are included the negotiation process can become very complicate and time consuming. Even deadlock can occur as everyone sticks to their own standpoint and perspectives, unwilling to move. On the other hand, when too few stakeholders are involved, an agreement might not be reached and implemented as there might not be a strong enough support base to carry the implementation process.

Strong leadership & vision

With regard to implementation of water management concepts such as IWRM, (political) leaders and figures with a strong vision to develop new directions and approaches are crucial. A combination of strong visionary leaders with access to political support is crucial to carry a process of change, in this case a process towards integration. These leaders and visionaries are required to have good communication skills and take an objective stance, knowing how to effectively facilitate the negotiation and decision making processes between different stakeholders. It is important that they create an open and transparent process where stakeholders involved have a high level of trust and low resistance to change.

Differing levels of trust in process

It is important for the different stakeholders to have a high level of trust in the process of change as this will determine their willingness to collaborate. The level of trust in a change process is very much dependent on factors such as: types of leadership; communication & information; as well as the kind of stakeholder processes. Distrust can arise in the processes due to labels that people put on other people as well as misperceptions. Some of the respondents simply state that peoples' selfishness causes distrust. In order to build trust and increase the level of openness to change, open communication is crucial whilst giving room to all different parties to state what their interests and perspectives are. It is also important to have clarity on the division of roles and responsibilities. Regular interaction between the different parties through formal as well as informal networks can create an atmosphere of trust and mutual understanding. Discontinuity of people involved in the process is not helpful in creating a sense of trust in the process and reducing resistance to change.

Limited sense of ownership

The involvement of different stakeholders is regarded as important as it will create a sense of ownership and responsibility. If for example powerful parties have not been included during the decision making process, the achievement of effective solutions can be hindered by them.

Complexity of structures

Many respondents highlighted the fact that on international level different types of governments are involved in the integration process. These governments have different national policies, interests, institutional structures and legal arrangements as well as varying levels of bureaucracy and approaches towards specific issues. Also on a national level, the complexity and diversity of structures, institutions and stakeholders involved can cause difficulties. For example, the structure of Dutch water management has been described as being complex with many institutions, authorities and stakeholders involved. According to some of the respondents, this structure is far more complex than necessary, making collaboration difficult and time consuming. Also the lack of incentives for optimizing the system does support the process of collaboration and integration. The focus being still very much on short term results without thinking about longer term and broader issues.

Power & accountability

With regard to the legal arrangements and setting, the respondents described the issue of limited legal power of International Commission for the Protection of the Rhine (ICPR) to ensure implementation of agreed decisions for action. Each member state has its own legal arrangements which can cause difficulties. It is consequently unclear how things are organised and how changes are legally supported and agreed upon over the long-term. This limited power of the ICPR is, however, counter-balanced by the existence of the Water Framework Directive (WFD). The WFD is more specific on how to deal with and involve stakeholders as well as develop formal agreements on problems to be solved. In this case both powers can be used: that of the European Commission (EC) for making sure agreements are carried through and that of the ICPR for negotiation and discussion between the different Rhine member states.

Sense of urgency & awareness

Environmental crises drive an increasing sense of urgency and awareness. In the case of the Rhine e.g. the Sandoz disaster provided a significant boost to the work of the ICPR and a renewed focus on integration. Such environmental disasters not only increase the sense of urgency but also develop an understanding that it is crucial to include relevant stakeholders as high ambitions cannot be realized without a proper support base. The focus on climate change and uncertainties is bringing together different interests and parties through a sense of urgency on different levels that affects the openness to change and willingness to cooperate and collaborate.

Clarity of roles & mandates

If clear division of roles and mandates are not identified difficulties will arise throughout the implementation process and collaboration will be complex and time consuming. It is important to have clarity on who is responsible for what, in other words clear division of roles and responsibilities.

Information access & availability

One of the issues highlighted by some respondents is that of a lack of international inspection capability between Rhine member states on the implementation of agreed measures. On a positive note, the same respondents stated that information with regard to water management of the Rhine is

now publicly available through websites and publications. Information and data availability is increasing through more and more sophisticated techniques and methods for collecting and sharing of information and data. It is emphasized by the respondents that it is very important that this information and data is communicated to different stakeholders in a way that is understandable and comprehensible.

Social & economic interests

It was stated that the economic situations of the countries involved influence how certain issues are prioritized and how much funding will go to environmental measures. There are high costs involved with the implementation of environmental measures and when the financial resources are limited the priorities might go elsewhere. According to one of the respondents a similarity of economic development between countries involved is an enabling factor for the integration process.

Discussion & Conclusions

The findings of this study indicate that there are different types of mediating factors that influence the planning and implementation of IWRM actions and interventions. Scientific literature on strategic and change management identify three categories of factors that influence the implementation of a change process (Pettigrew and Whipp, 1991; Devos and Buelens, 2003) as well as the reactions of players involved in change efforts (Armenakis & Bedeian, 1999): content factors; context factors; and process factors. These categories of factors are described in more detail below:

1. *Content factors:* are factors that are directly related to theory and its use in practice. Oliver (2001) argues that the purpose and shape of theory may not be fixed and depends upon how individuals conceptualise and perceive this theory. In other words, the users of IWRM theories develop their own perceptions of IWRM and these conceptions influence planning and implementation of IWRM actions and interventions;

2. *Contextual factors:* refer to the internal and external environment that complicates and/ or facilitates the planning and implementation of IWRM and include issues such as the formal institutional structures,

the political and scientific cultures and environmental awareness. In other words, independent of what theory is being implemented, the contextual factors explain why an intervention or action has not been or cannot be successful;

3. *Process factors:* apart from the overall context, the way and manner in which a theory or concept is implemented will affect the result of the process. The process factors refer to how collaboration and decision-making is organised, referring to issues such as the types of organizations, facilitation of the process and inclusion or exclusion of stakeholders.

These above described categories of mediating factors and inter-dynamics are visualised in Figure 3 below:

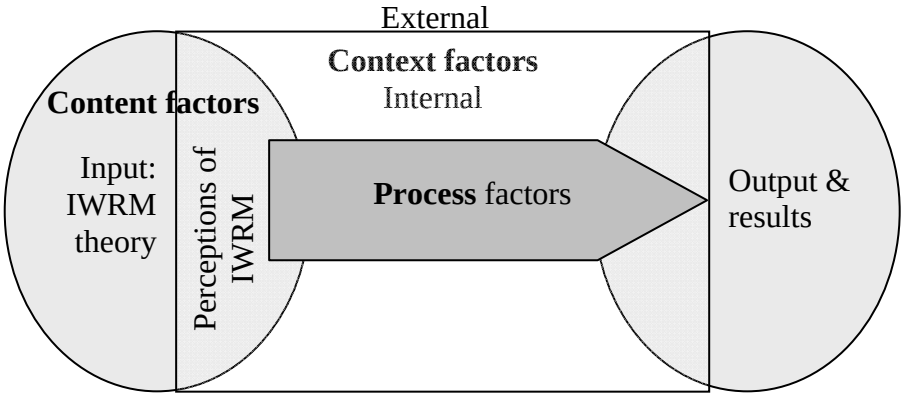

Figure 3: Categories of mediating factors and their inter-dynamics

The above figure shows that the different mediating factors that influence theory to practice process for IWRM are intricate and complex. This study has focused on the investigation of context as well as process factors that influence the implementation of IWRM and its outcome but has not evaluated in-depth the content factors. These will be researched in a follow-up study in combination with a more thorough analysis of the context and process factors.

One of the most frequently identified factors highlighted during the interviews is the resistance to change that exists amongst players involved in planning and implementation of IWRM. Most managers and academics have accepted that change is unavoidable, but research has also indicated that only one third of all change initiatives achieve any success (De Vos &

Buelens, 2003) and a key element in a change process is the openness of players involved towards change (Schein, 1980). Schein (1980) states that change in structures, institutions, organizations, etc are mediated through individual change. In other words, the importance of the individual cognitive-affective nature of change should not be underestimated. Armenakis and Bedeian (1999) indicate that content, context and process factors all affect reactions to change but Self *et al.* (2001) state that studies that have assessed these three factor categories simultaneously, as they relate to processes of change, are rare.

In conclusion we note that simply identifying the nature of mediating factors is only a first step towards development of a comprehensive and informed model of how IWRM theory is or is not converted into practice. Further analysis of this and other case study material is planned to generate such a model. At this early stage it would be somewhat naive to claim anything other than indicatory power for the factors listed and discussed above. However, it does appear that those involved in IWRM implementation are capable of articulating their experiences of turning theory into practice: an encouraging finding in itself and one that bodes well for diagnosis and prescription.

References

Aldenderfer M.& Blashfield R. (1984); Cluster Analysis, SAGE Publications Inc., Newbury Park, CA

Armenakis, A.A. and Bedeian, A.G., 1999. Organizational change: A review of theory and research in the 1990s. *Journal of Management,* 25: 293-315.

Bernard, H. R. 1994. Research Methods in Anthropology: Qualitative and Quantitative Approaches, 2nd Ed. Walnut Creek, CA: Alta Mira Press

Biswas, A.K., 2005. Integrated Water Resources Management: A Reassessment. In Biswas, A.K., Varis, O. & Tortajada, C. (Eds.) *Integrated Water Resources Management in South and Southeast Asia.* pp. 325-341. New Delhi: Oxford University Press.

Bogdan, R., & Taylor, S. J. (1975). *Introduction to qualitative research methods: A phenomenological approach to the social sciences.* New York: John Wiley & Sons.

Brenner, M., Brown, J., and Canter, D. (Eds), 1985. *The Research Interview: Uses and Approaches*, Academic Press, London.

Creswell, J.W., 2003. *Research Design – Qualitative, quantitative, and mixed methods approaches*. Second Edition, CA: Sage Publications.

Devos, G. and Buelens, M., 2003. Openness to organizational change: the contribution of content, context and process. *Vlerick Leuven Gent Working Paper Series 06*. Vlerick Leuven Gent Management School.

Dewulf, A. Craps, M. & G. Dercon (2004). How issues get framed and reframed when different communities meet. A multi-level analysis of a collaborative soil conservation initiative in the Ecuadorian Andes. Journal of Community and Applied Social Psychology, 14, 177-192.

Drever, E., 1995. *Using Semi-Structured Interviews in Small-Scale Research*, Scottish Council for Research in Education, Glasgow.

Eisenhardt, K.M. and Graebner, M.E., 2007. Theory building from cases: opportunities and challenges. *Academy of Management Journal,* 50(1), 25-32.

Eisenhardt, K.M., 1989. Building theories from case study research. *Academy of Management Review,* 14(4), pp. 532-550.

Glaser, B. and Strauss, A., 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research* , Alding Publishing Company, Chicago.

Guba, E.G. and Lincoln, Y.S., 1994. Competing paradigms in qualitative research. In N.K. Denzin and Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.

GWP-TAC (Global Water Partnership – Technical Advisory Committee), 2000. Integrated Water Resources Management. *TAC Background Paper No. 4*, Stockholm: GWP.

Husserl, E. (1970). The crisis of the European sciences and transcendental phenomenology (D. Carr, Trans.). Evanston, IL: Northwestern University Press.

Jeffrey, P. and M. Gearey. 2006. Integrated water resources management: lost on the road from ambition to realisation? *Water Science & Technology* 53 (1): 1–8

Jonker, L., 2002. Integrated water resources management: theory, practice, cases. *Physics and Chemistry of the Earth*, 27, pp. 719-720.

Krippendorff, K. (1969). Models of messages: three prototypes. In G. Gerbner, O.R. Holsti, K. Krippendorff, G.J. Paisly & Ph.J. Stone (Eds.), *The analysis of communication content*. New York: Wiley.

Lemon, M., Jeffrey, P., McIntosh, B. and Oxley, T., 2004. Understanding the perceptions of change: a pathway contribution to community consultation and environmental decision making. Journal of Environmental Assessment Policy and Management, 6(2), pp. 1-23.

Matondo, J.I., 2002. A comparison between conventional and integrated water resources planning and management. Physics and Chemistry of the Earth, 27: 831-838.

Mayring, P., 2000. Qualitative content analysis. Forum: Qualitative Social Research, 1(2).

Odendaal, P.E., 2002. Integrated Water Resources Management (IWRM), with special reference to sustainable Urban Water Management. In: CEMSA 2002 Conference, Johannesburg, South Africa.

Oliver, R. (2001). Exploring the development of critical thinking skills through a Websupported problem-based learning environment. In J. Stephenson (Ed.), *Teaching and Learning Online: Pedagogies for New Technologies* (pp. 98-111): Kogan Page.

Pettigrew, A. and Whipp, R., 1991. Managing Change for Competitive Success. Oxford: Blackwell .

Robson, C., 2002. Real world research. Second edition. Blackwell Publising.

Ryan, G.W. and Bernard, H.R, 2003. Techniques to identify themes. Field methods, 15(1), p85-109, Sage Publications.

Rynes, S., Bartunek, J. and Daft, R., 2001. Across the great divide: knowledge creation and transfer between practitioners and academics. *Academic Management Journal*, 44, pp. 340-355

Schein, E.H., 1980. Organizational psychology. Englewood Cliffs, NJ: Prentice Hall.

Self, D.R., Armenakis, A.A. and Schaninger, W.S.Jr., 2001. Employee reactions to organizational change content, process, and context: A simultaneous analysis. Unpublished paper.

Simonovic, S.P., 2000. A shared vision for management of water resources. Water International, 25(1): 76-88.

Tensaki, R.V. and Hay, G.W., 2004. Actionable knowledge and scholar-practitioners: a process model of theory-practice linkages. *Systemic Practice and Action Research*, 17(3).

Wolcott, H. F. (1994). Transforming qualitative data: Description, analysis, and interpretation. Thousand Oaks, CA: Sage.

Wurbs, R., "Dissemination of Generalized Water Resources Models in the United States," Water International, 23(3):190–8, 1998