Chapter Two – Literature Review, an Overview of Integrated Catchment Management

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2.1 Introduction

> *"Water is the basis for all living ecosystems and habitats and part of an immutable hydrological cycle that must be respected if the development of human activity and well-being is to be sustainable" (World Water Vision, Cosgrove, Rijsberman and For the World Water Council 2000, pg. vi).*

In an international survey of experience in implementing LA21 processes, ICLEI found that *"Water resource management is the common priority issue for municipalities in all world regions and regardless of economic situation"* (International Council for Local Environmental Initiatives 2002). Serious problems arise from every aspect of society's interaction with water, problems which span environmental, social and economic spheres. These problems are intimately related, given a long enough time frame for analysis. Health problems increase in areas of high pollution, and where water supply is limited due to landscape and hydrological modifications. Lack of clean water can pose problems for long-term economic stability.

Water is a solvent, and carries the chemical imprint of the pollutants it picks up as it travels through the landscape and collects air borne pollution from rain. Rivers have always suffered the full impact of environmental pollution and land use change; due to the combination of their use to dispose of wastes, and the inexorable effects of water flow and gravity. Water flow provides a framework for thinking of impacts throughout the landscape and atmosphere, as well as across political boundaries (Flournoy 1995).

International awareness of what has variously been termed the 'water crisis' and 'water stress' has increased, as indicated by the plethora of international forums focused on water, from the 1977 Mar del Plata conference in Argentina, to the influential Dublin

Conference in 1992, to the Bonn International Freshwater Conference, the water sectors' lead-in to the World Summit on Sustainable Development (See Appendix Five for full list and details). The subtitle of the Bonn conference, *Water - Key to Sustainable Development*, points to the pivotal role of water resources on the international stage.

2.1.1 Structure of this Chapter

This chapter takes a broad, international overview of the major themes and issues in river basin planning. The first section looks at historical shifts in thinking about catchment management and discusses key management trends arising from consideration of the long-term sustainability of water resources. Themes arising from this review of academic literature are illustrated with examples from international case studies. This chapter concludes with an overview of the recently enacted European Union Water Framework Directive (WFD), the most ambitious broad-scale application of the principles of Integrated Catchment Management to date. This research explores ways of maximizing the long-term social and environmental benefits of stakeholder participation in planning required by environmental legislation such as the Water Framework Directive.

2.2 Catchment Management

The field of Integrated Catchment Management has arisen from an awareness of the limitations of trying to solve problems in the water field in isolation. Internationally there is an increasingly recognised need for thinking of water management in terms of catchments[7]. This has a long pedigree in ecological thinking. In the early 70's Odum (1971, pg. 134) stated *"it is the whole drainage basin, not just the body of water, that must be considered as the minimum ecosystem unit when it comes to man's interests".* What is new is the widespread political acceptance of this concept. The World Bank, the USEPA and the United Nations Economic Commission for Europe have recognised catchments as important units for integrating land use planning and water management (UN ECE 1993; USEPA 1992, 1996; World Bank 1993). The World Water Vision Commission Report (World Water Council 2000) states that it is essential for basin-level administrative structures, linked to sub-basin

[7] A river catchment is the land area from which the waters drain to enter the river. In USA usage, a catchment is called a drainage basin or watershed. The boundary of a drainage basin is known in the USA as a drainage divide, and as a watershed in other English speaking areas (Steiner et al. 2000).

structures, to be set up for all waters if the ideal of integrated water resource management is to be achieved.

2.2.1 Historical Overview

> *"Looking at the past is essential if we are to actively create water futures. To the degree that humanity's destiny is so tied to water, we should be looking to our water past" (Priscoli 1998, pg. 625).*

The history of catchment management is a tale of humans' effects upon, and dependence on, the water cycle. Efforts to manage river basins extend 5000 years into recorded history. Toynbee (1972, pg. 96) discusses the *"miracles which the Nile and Euphrates once performed for Egyptian and Sumeric irrigation-engineers".* William Wilcocks attempted to coordinate needs within a basin in the Nile in the 1890s. In India, Command Area Development Authorities attempted integrated planning in irrigated areas by the nineteenth century (Barrow 2000). Up until 1984, the FAO has discovered more than 3600 treaties related to water use, outside of navigational treaties (Priscoli 1998).

Use of landscapes prior to the Industrial Revolution had profound effects on the environment, and created several significant environmental problems. The desiccation of areas of Southern Europe, where the Roman Empire turned oak forests into boats and the land previously sheltered by the trees into eroding, brittle hillsides, is one example. The scale of human impact was, however, largely localised. The vast flows of materials transformed by industrial processes now pose threats to the environment on a global scale.

Shifts in thinking about management have largely come about as responses to crises and catastrophes (e.g. Douglas, I., Hodgson and Lawson 2002). The period from the Industrial Revolution to the burgeoning environmental movement in the 1970's was characterised by taking resources for granted in development. This is echoed in the title of a report about Britain's waterways *Taken for Granted* (HMSO 1970). Whilst it is common now to talk of 'unintended consequences' from development, problems from pollution have occurred at every stage of the Industrial Revolution, as seen from this description of the River Irwell in the 1870 Rivers Pollution Commission Report:

> *"Through this scum, here and there, at intervals of six and eight yards, heavy bursts of bubbles were continually breaking, evidently rising from the bottom; and wherever a yard or two of the scum was cleared away, the whole surface was seen simmering and sparkling with a continual effervescence of smaller bubbles rising from various depths in the midst of the water, showing that the whole river was fermenting and generating gas. The air was filled with the stench of this gaseous emanation many yards away" (Rivers Pollution Commission 1870).*

An attempt to develop a historical timeline of shifts towards ecological awareness is dogged by the fact that there have been strands of thinking opposed to the 'mainstream' of ideas since the beginning of the Industrial Revolution. Much modern environmental thought can be traced to John Ruskin, who had a profound influence on later thinkers such as Ghandi. Speaking of the environmental problems he could see developing from the Industrial Revolution, he reflected:

> *"God has lent us the earth for our life; it is a great entail. It belongs as much to those who are to come after us, and whose names are already written in the book of creation, as to us; and we have no right, by anything that we do or neglect, to involve them in unnecessary penalties, or deprive them of benefits which it was in our power to bequeath." John Ruskin (quoted in Farmer 1996, pg. 70)*

The early environmentalist, John Perkins Marsh discussed the links between use of the land and degradation of water quality. He saw restoration of land degraded by industrial actions as essential, *"the task is to become a co-worker with nature in the reconstruction of the damaged fabric"* (Marsh 1965, originally published 1864, pg. 35).

However, despite these countervailing voices, early approaches to environmental problems were characterised by single objective solutions, and an attempt to fix the symptoms of the problem, not necessarily its causes. As Tait et al (2000, pg. 158) suggests, *"in the past, the response has often been to manage one problem (unknowingly) at the expense of others".* In more recent times, planning for single sectors and single solutions has been exacerbated by funding for projects coming

from government departments responsible for only one aspect of water management, such as water supply, with little integration between departments (e.g. Cate 1999).

Major shifts in thinking about river management have occurred in the USA, a country noted for its large scale engineering solutions to problems in river environments. Engineering to maintain navigable rivers reduced fish populations and increased vulnerability in some areas to flooding. Multi - objective planning, in particular in flood-plain management, was developed in response to criticisms of simplistic responses to problems. It was pioneered in the Tennessee Valley Authority (Case Study 2-1), and has gained widespread acceptance in the last decade (Riley 1998).

Case Study 2-1 Tennessee Valley Authority, USA

Tennessee Valley Authority – Multi-Objective Planning

The roots of Integrated Catchment Management can be traced to the Tennessee Valley Authority (TVA) in the 1930s (Hollis and Acreman 1994). The initial impetus for this was an attempt to deal with the flooding on the lower Mississippi, after the great flood of 1927. The New Deal agency was given a high degree of authority over the 40, 910 mile^2 catchment of the Tennessee River (Riley 1998). While it is recognised that the vision of the TVA was never fully realised in practice, it represented a significant move towards considering social and ecological factors organised around a river catchment. It also represented a shift towards multi-objective planning, where flooding, economic development and agricultural needs were taken into account in planning (White, G. F. 2000). Some historians posit that the TVA model did not spread in the USA due to resistance from other large bureaucracies that managed water, and which felt threatened by the process of integrated management called for in a basin wide approach (Priscoli 1998).

The TVA model has been heavily criticised. Jacobs (1985) suggests social conditions in the area were actually worsened by the economic approach taken, with a heavy emphasis on only one form of economic development, electrical supply from large-scale dams. Similar projects, expounded in Africa as River Basin Development Authorities, are criticised as unsuccessful when viewed through the lens of sustainability criteria. Many of the projects had unintended negative effects in areas other than the major objectives being pursued (Perritt 1989).

A further impetus towards multi-objective planning came from an increased call for Cost Benefit Analysis (CBA) of large projects, particularly in the USA, where large-scale projects which benefited a small number of private landowners, yet used a large amount of federal money, were questioned. In the 40's there was increased pressure for public projects to show that they delivered broad public benefits (Riley 1998). Benefits included *"the prevention of losses that might occur".* However, the CBA of these large projects did not take into account losses to ecosystems which could arise from engineering works, until the passage of the National Environmental Policy Act (NEPA) of 1969 (White, G. F. 2000, pg. 33).

In the 1950's in the USA the division of responsibilities between the Soil Conservation Service, which became responsible for upland soil conservation, and the Army Corps of Engineers, which was responsible for flood management in the lower basins, exacerbated fragmentation of river planning. By 1960, however, the Army Corps had completed a basin-wide plan of the Delaware River Basin, which aimed to enhance inter-agency coordination (Riley 1998).

Earth Day, on April 22nd, 1970 marked the beginning of a profound change in US politics, leading to the creation of the Environmental Protection Agency, which was envisioned as promoting integration, being assembled *"from the sinews of three federal Departments, three Bureaus, three Administrations, two Councils, one Commission, one Service, and many diverse offices"* (Environmental Protection Agency 2002).

In 1989, a series of workshops were held across the United States, conducted by Congressmen and the National Park Service, on *'multi-objective river corridor management and planning'* which aimed to *"encourage comprehensive and cooperative planning among all individuals and institutions concerned with rivers and their adjacent lands"* (Congressmen Joseph M. McDade and Morris K. Udall 1989; quoted in Riley 1998, pg. 43). The USEPA now advocates ecological management and restoration at the level of watersheds (e.g. Freemark 1995; USEPA 1992, 1996). This move to catchment based planning is based in part on the USEPA's expanding role in regulating non-point pollution[8], and in protecting remaining wetlands from further loss (Riley 1998).

[8] **Non-point pollution** is pollution from diffuse sources, such as from agricultural run-off, as opposed to pollution from a readily identified, concentrated source, such as a factory outfall.

A sense of responsibility to the land and waters has become more widespread. This is best shown in Leopold's (1968, pg. 204) concept of the land ethic, in which land includes *'soils, waters, plants and animals'*. A parallel shift has been in recognising river restoration as an important ecological, economic and social activity. In the USA the rate of dam decommissioning now exceeds that of building new dams (World Commission on Dams 2000). Restoration efforts have been seen to benefit tourism and the images of regions and towns, positively benefiting the local economy, such as in the San Antonio River Walk in Texas (Riley 1998). Landscape degradation from urban development, forestry and intensive agricultural practices are causes of the perceived need for river restoration. Restoration is also called for in response to former engineering of the rivers, in order to restore natural hydrological functioning to straightened and engineered rivers, as in the case of the Kissimmee (Case Study 2-2).

Case Study 2-2 The Kissimmee River, Florida, USA

Large Scale Restoration – The Kissimmee River, Florida

The Kissimmee River used to meander through roughly 100 miles of land noted for its high wildlife value. In an effort to reduce flooding, the Army Corps of Engineers channelised the river into a 50 mile ditch between 1961 and 1971, with a loss of 40, 000 acres of wetlands. Significant loss of species resulted, along with negative impacts on the water quality of Lake Okeechobee. The impetus for restoration was spearheaded by a coalition of sportsmen and environmentalists. Only *five years* after the channelisation was complete, the 'State of Florida Kissimmee River Restoration Act' was passed. Initial experience in restoration pointed to the need to fill in the canal and allow the river to return to its original meander (Riley 1998). Today, this project aims to restore 40 miles^2 of the river and associated floodplain ecosystems, which will include 43 miles of meandering river channel and 27,000 acres of wetlands. 22 of the 56 miles of flood control canal will be backfilled, with the remainder kept for flood control. The overall project cost for the main works is estimated at $414 million (South Florida Water Management District 2002).

European countries have a long history of developing strong environmental policies, partly in response to population pressures, and to the impacts of environmental pollution becoming apparent after centuries of industrial development. The very visible occurrence of unusually large numbers of seals dying in the 1980s helped to catalyse international and interdepartmental action to reduce pollution flowing into the Baltic

Sea (e.g. Robert 1991). In Holland, a keen awareness of the need to plan for large scale flooding, and an awareness of the lack of space for disposing of wastes, has led to integrated planning at the level of whole rivers and the development of broad scale environmental plans (e.g. van de Kerkhof and Leroy 2000; van Rooj, Liefveld and Mass 2001; Verheem 2000). In England, a shift towards catchment-wide planning was initiated with a 1921 report of the Board of Trade Water Power Resources Committee. This culminated in the creation of the National Rivers Authority in 1989[9].

Integrated Catchment Management (ICM), also known as 'Total Catchment Management' is the *"integration of land and water management"* (Gardiner 1996, pg. 52). The term was first coined by Gardiner, and formalised in the late 80's. It is seen as a way to apply the concept of sustainability to the water sector and aquatic environment (Gardiner 1984).

The concept of ICM has developed in tandem with a shift to 'soft engineering' in flood management and replacement of the idea of eliminating flood risk with the concept of 'elegant failure' (Case Study 2-3). This shift has been given impetus by the acceptance of a climate of inherent risk and uncertainty in flood plain management stemming from a realisation that flooding *will* occur, and engineered structures are both limited in their ability to mitigate damage and are capable of failing under pressure (Riley 1998).

Recent years have seen an increased call for developing partnerships and broad stakeholder and public engagement in Catchment Planning. The MBC is recognised as *"a model for what will become an increasing need for engaging coordinated action through a partnership approach"* (Wood, R., Handley and Kidd 1999, pg. 342). Researchers have suggested that there is an inherent need for a partnership structure in order to incorporate thinking about different stakeholder uses and needs in ICM. Extensive peer review and dialogue is seen as a way of dealing with the complexity of knowledge about river systems and the inherent uncertainty in a dynamic and changing environment (e.g. de Marchi et al. 2000; Funtowicz and Ravetz 1994; Luks 1999).

[9] Under the Environment Act, 1995 the National Rivers Authority was incorporated with HM Inspectorate of Pollution and the local authority Waste Regulation Authorities, providing a river-based organisation charged with the task of delivering sustainable development in the UK (UK Government 1996)

Case Study 2-3 Napa River Flood Plan, California, USA

Ecological Engineering and Integrated Planning

In Napa, California the local community rejected an extensive, conventional flood prevention project. It was seen as too expensive and to have too many unacceptable negative consequences for wildlife. This rejection led to the creation of an alternative plan, developed with an innovative stakeholder participation process. The core goal for this plan was to promote stream stabilization using natural processes. A variety of means were used to develop what is known as the *'living river strategy'*, coordinated by an ad hoc Interagency County-wide task force. Extensive public participation was catalysed both in the planning and implementation of the plan. A GIS was developed to show various aspects of the river, such as hydrological flow data, stream geomorphology, rainfall/runoff relationships and vegetation effects on river flow and form. Local stewardship groups collect data. Measurable milestones are used to communicate about progress. The GIS is made publicly available through the Internet, to support local planning (Napa County Resource Conservation District 2002a). The Education Advisory Committee developed a curriculum for use in schools and initiated an 'adopt the watershed' programme as a focal point of studies. The University of Davis offers practical advise on restoration and conducts research in the area.

Regional park areas were planned, enhancing public access through bike paths and trails whilst reducing random access to the river. At the same time, local landowners were involved in planning and implementation, coordinated through a freely available *Owner's Manual*, with recommendations ranging from alternative viticulture practices to creating stream side buffer strips (Napa County Resource Conservation District 2002b). Work on both public and private land was seen as necessary in order to develop contiguous habitat in the area. Northern California has a wide variety of creek restoration groups (Oakland Museum of California 2002), and these stakeholders were engaged in the planning process along with NGOs interested in the environment of the area.

Public benefits were seen to include *"increased property values of those properties containing the corridors, and those adjacent to the corridors"* (Napa County Resource Conservation District 1997, pg. 22). The project aimed to introduce a land ethic and enhance a sense of stewardship in the region. Multi-objective planning aimed to instil a sense of preventative care in order to prevent future problems in the river (Napa County Resource Conservation District 1997).

In line with the debate about sustainability and sustainable development, which reached international significance with the publication of the Brundtland Report (World Commission on Environment and Development 1987), the sustainability of catchments is now a focal point for discussion. This has been particularly prominent since the Rio Earth Summit in 1992. Key developments over the last three decades in understanding water resources include increased emphasis on: the role of gender relations, the rights and knowledge of indigenous peoples and the significant and devastating effects of badly managed water on the well-being of the poor of the world. This has led to an awareness of access to clean water as a human right (Case Study 2-4).

Case Study 2-4 The Constitution of the Republic of South Africa

Water as a Human Right

South Africa was the first country in the world to enshrine the right to water in its constitution. Section 27(1)(b) under the Bill of Rights states: “Everyone has the right to have access to sufficient food and water” (Government of the Republic of South Africa 1996).

South Africa is the 26th most water stressed nation state in the world, and a country noted for its hydrological extremes (Newson 2000). The change of political system offered many opportunities and challenges in the management of the country’s water. The newly enfranchised electorate expected to see significant and rapid improvements post apartheid, including access to clean drinking water and sanitation.

The South African Constitution laid down the right for all its citizens to have “an environment not harmful to health and well-being” (quoted in O'Riordan 2000b, pg. 36). The National Water Act of 1998 entitled all citizens to 50 litres of water per day within 250 metres of their homes (internationally agreed amount required for basic household use and health) (World Commission on Dams 2000). It is recognised that this goal will not be met by merely attempting to supply more water through resource development. Paramount importance is placed on the use of water for meeting human needs and maintaining ecosystems (Conley and van Niekerk 2000, pg. 139). The shift in thinking about water resources in South Africa includes the view that water needs to be seen as a continuous hydrological system, managed in association with land. The recently created Catchment Management Committees are an innovative attempt at enhancing stakeholder participation and decentralised decision making, within a national structure (Lamoree and Nilsson 2000; van Niekerk, Kuhn and Kempster 2001).

In recent Catchment Planning efforts, the concept of sustainability has been used as a tool for integration. The Lake Superior Management Plan (Case Study 2-5) integrates broad-scale public participation with ecological design principles, aiming to create a vision of future development that does not *cause* pollution (Lake Superior Binational Program's Superior Work Group and Binational Executive Committee 2000).

Case Study 2-5 Lake Superior Management Plan, North America

Sustainability as an Overarching Goal

An overall vision of sustainability in the Lake was developed through a participatory process. This was used to coordinate information. Indicators of sustainability were developed in the following areas: reinvestment in natural capital in the basin, the quality of life in the area, resource consumption patterns, citizens' awareness of capacity for sustainability and measures of economic vitality. Data from many existing sources were collected in order to gauge the state of the area with regards to sustainability.

This programme was communicated broadly through education programmes, surveys to gauge attitudes and programmes to disseminate the findings from data collection and synthesis. Initiatives to improve the state of the Lake and its environs are developed in the light of information from this survey process. These range from the recycling of fluorescent lamps, to an ambitious proposal to develop a fund for green business start ups, to two Industrial Ecology business parks as demonstration of alternative industrial practices. Such changes will require a high degree of involvement from community leaders. Public Advisory Committees and forums are planned to help discuss options and plan actions. Achievement of objectives will be measured and assessed through a similar process, using both Canadian and US data. This data will be used in education about trends over time (Lake Superior Binational Program's Superior Work Group and Binational Executive Committee 2000).

There has been a long history of thinking of water resources in terms of catchments. As discussed above, recent decades have seen several important shifts, in part responding to lessons learned from the unintended consequences of interventions in river systems and in response to a shift towards integrated planning prompted by a sustainability imperative. Integrated Catchment Management is increasingly seen as vital for the long-term planning of water systems and the river environment.

2.2.2 Common Problems with ICM

Though there are many advantages to management focused on discreet geographical areas, there are limitations to an exclusive focus on catchments in planning. Not all environmental impacts can be predicted at this level of scale, a difficulty compounded by the lack of ability to predict carrying capacity of a catchment due to flows of materials and energy between regions. Geographically disperse ecological footprints[10] export impacts outside catchment boundaries (e.g. Therivel et al. 1992).

A geographic focus can limit thinking about sustainability to landscape based issues, and may lead to a neglect of less obvious areas of natural capital, such as mineral deposits and atmospheric regulation (England 2000). Groundwater and surface water catchments do not always coincide, due to differences in underlying geology. The recharge zones for groundwater require specific attention and protection (e.g. Collin and Melloul 2001; Hiscock 2000). Certain sectors, such as energy and agriculture, while having a physical manifestation in a catchment basin, are also influenced by policy decisions that take place outside the scope of a particular ICM plan (Tzilivakis et al. 1999). At the same time, they may have broader effects than in a catchment, and should be assessed based on their interactions with the global environment.

Administrative structures and social groups may have different boundaries than catchments. Kolavalli and Kerr (2002, pg. 222) suggest that they may be a "*cumbersome unit for a socio-economic programme*" and note the need to work within existing social organisations in a catchment context, paying particular attention to NGO's involved with local communities. Very large catchments may need to be further subdivided into sub-basins based on tributaries to facilitate management.

River catchment authorities often play no more than an advisory role, lacking the ability to enforce decisions. Inadequate resources often limit their scope and effectiveness. They may not have a remit over the entire basin, which means that activities in one part of the basin can threaten other areas, especially downstream. The sheer complexity of the sectors, actors and issues mean that coordination can be onerous and frequently

[10] An **ecological footprint** is an 'ecological accounting tool' which calculates the total amount of land required for all of the goods and services consumed by the entity which is being assessed (e.g. household, company, industrial process, river basin, country). It aims to translate ecological impact into a common, easily understood measure, and acts both as a benchmarking tool and an educational model. It is estimated that with current resource consumption patterns and population, if everyone lived like North Americans, we would require at least two Planet Earths to provide the population with goods and services (Wackernagel, Rees and Testemale 1995).

insufficient. In particular, conflicts and lack of understanding amongst groups can lead to a lack of cooperation and sharing of vital information (Barrow 2000).

Insufficient support from local communities, engendered by a lack of involvement and understanding of key issues, can undermine efforts to improve the river environment. Overly centralised bodies can become rigid and unresponsive to changing circumstances, unable, in particular, to communicate with NGOs and communities (Barrow 2000). Whilst stakeholder representation on ICM authorities is seen as essential for a full understanding of the issues at stake, special interest groups can exert undue influence on the direction of the planning. Scrutiny from bodies with regulatory powers and the ability to analyse the activities of a river basin authority may be necessary to add an essential overview.

Difficulties in achieving cooperation can be exacerbated by inequalities in resource distribution between parties in ICM groups, either within or between countries (Blackmore 1995). Further difficulties and criticisms of the process of engaging public participation are discussed in Chapter 5, in Section 5.7.1 ‘Critique of participation in planning’ on pg. 174.

The problems described above are to an extent inevitable in any complex planning process. In a comprehensive review Wolman (1981) reflects that river basin management requires continuous attention and an iterative approach. He suggests it is more of an art than a rational science, and an art requiring sensitivity to the context of each river.

2.2.3 Summary

Despite the difficulties detailed above, the case studies in this chapter suggest that there are many benefits to be gained from implementing innovative management structures and ICM processes.

Key principles of ICM can be summarised as:

- the need to focus on water as a basic need for all humans, and to develop the technical and political changes necessary to achieve water security;
- the need to look at *all* of the impacts of water in a catchment in order to solve environmental problems and unintended consequences;

- the need to look at rivers as dynamic, connected systems, and to allow natural processes to do engineering work, with a related retreat where possible from flood plains, or from the negative impacts of floods on human systems;
- the need to look at the way in which water is supplied, used and disposed of as an integrated system;
- the need for an integrated framework of knowledge for developing and sharing information amongst a range of actors in a catchment;
- the need to change behaviour in a multitude of stakeholders and actors in a river basin in order to achieve long-term, sustainable management of water;
- the need for partnership building and participation in planning in order to achieve the broad changes necessary for sustainable catchment management.

The last two decades have seen a call for increased integration in water management, driven by recognition of the limits of a fragmented organizational approach and an increased understanding of the interconnected nature of water related issues. The newly enacted European Union Water Framework Directive (WFD) offers an unparalleled opportunity for improving the way that river basins are managed. The WFD can be seen as the most ambitious and broad-ranging application of ICM principles to date. The following section outlines the key components of this directive.

2.3 European Union Water Framework Directive

The overarching theme of this innovative legislation is 'integrated water management at the basin level'. The ambitious nature of the directive, which aims to bring all water bodies in the Union to good ecological status[11] by 2015, is discussed in Bloch (1999). The directive was accepted in Dec. 2000 (European Commission 2000) after three and a half years of negotiation. It is part of a move within the European Commission to integrate environmental and sustainability awareness into all levels of policy and early stages of decision making (Feldmann, Vanderhaegen and Pirotte 2001).

[11] Whilst the exact definition of good ecological status is still to be determined, the spirit of the law sees this as a state close to one as if there was no human interference on the landscape. The need to measure indicators of ecological status, including absence or presence of key species is seen as raising the water quality bar higher than a requirement only to report on chemical status of water.

The European Union has had a significant effect on British policy in terms of pollution control and conservation. Increasingly sustainability is seen as a key policy driver, influenced initially by 'moral pressure' from the UN, and lessons learned from Agenda 21 process (Selman 2000). European environmental policy has shifted during the time period of the 5th Framework programme, 1993–2000, to an emphasis on sustainable development, integrated management and subsidiarity (Kallis and Butler 2001).

A key aspect of the WFD is that it is an objective-led policy, setting standards in terms of outcomes that should be achieved, as opposed to laying out detailed prescriptions of actions to be undertaken. The key aims of the WFD can be summarised as (adapted from Council of the European Communities 2000):

- no further deterioration in quantity and quality of waters in the Union;
- requirement that all waters in Europe, groundwater, surface and estuarine, should reach 'good status' by the year 2015[12];
- good status of surface water to include biological, hydro-morphological and physical-chemical aspects;
- goal for groundwater is to achieve good status in terms of chemical properties and quantity;
- phase out emissions of priority substances and reduce pollution;
- identify and protect water bodies used for drinking water abstraction;
- protect and enhance the status of aquatic ecosystems, terrestrial ecosystems and wetlands;
- and to mitigate effects of floods and droughts.

The WFD *"formalises the environment as a 'user' of water and establishes it at almost an equal footing with other human economic*

[12] Exceptions to the deadline of 2015 to achieve good ecological status include heavily modified water bodies, which are required to achieve good ecological potential, and some bodies of water which will be granted derogations due to modification e.g. for flood control, or particular problems, and have until 2027 to achieve good ecological status. They should aim for good ecological potential by 2015. Derogations do not allow for any deterioration in the status of the water body. Reasons for derogation must be clearly laid out in RBMPs. Exemptions may also be granted for unforeseen or exceptional circumstances, such as a major flooding event, as long as reasonable steps are taken to restore the water body following the event (Chave 2002).

activities" (Kallis and Butler 2001, pg. 140). Procedural objectives for implementing the directive include:

- a River Basin Management Plan[13] must be developed for each river basin in the Union by 2009;
- River Basin District Plans much be formulated with a high degree of stakeholder and community involvement;
- streamlining of existing legislation, with seven former directives replaced by one integrated piece of legislation;
- use incentives to encourage sustainable water use based on a long-term protection;
- and water pricing policies to account for full cost of service provision (operational, capital and environmental)[14].

An aim of the WFD is to simplify existing, often conflicting, laws. Much environmental regulation was *"created in reaction to a particular environmental crisis or to political pressures. This has resulted in a tangle of overlapping and contradictory provisions"* (Resource Renewal Institute 2001, pg. 52). Seven previous directives have been repealed, with their provisions integrated into the single WFD, covering:

- Surface Water Abstraction
- Measurement Methods and Sampling Frequency
- Exchange of Information on Fresh Water Quality
- Freshwater Fish
- Shellfish Waters

[13] Plans are to include (and Chave 2002; adapted from Kallis and Butler 2001):
- information on ecoregions and reference conditions;
- maps showing protected areas;
- maps showing monitoring network;
- significant pressures on the aquatic environment from point and non-point sources;
- economic analysis of the uses and costs of water;
- evidence of public participation measures undertaken in production of, and impact on, plan;
- Sub-basin plans;
- measures to control priority substances and reduce accidental pollution;
- and a summary of programme of measures necessary to achieve the objectives of the WFD.

[14] This condition is derogated for Southern Mediterranean Member States, due to highly subsidised water provision in the agricultural sector.

- Groundwater
- Dangerous Substances Directive (there is a new list of priority substances and a combined approach in the WFD).

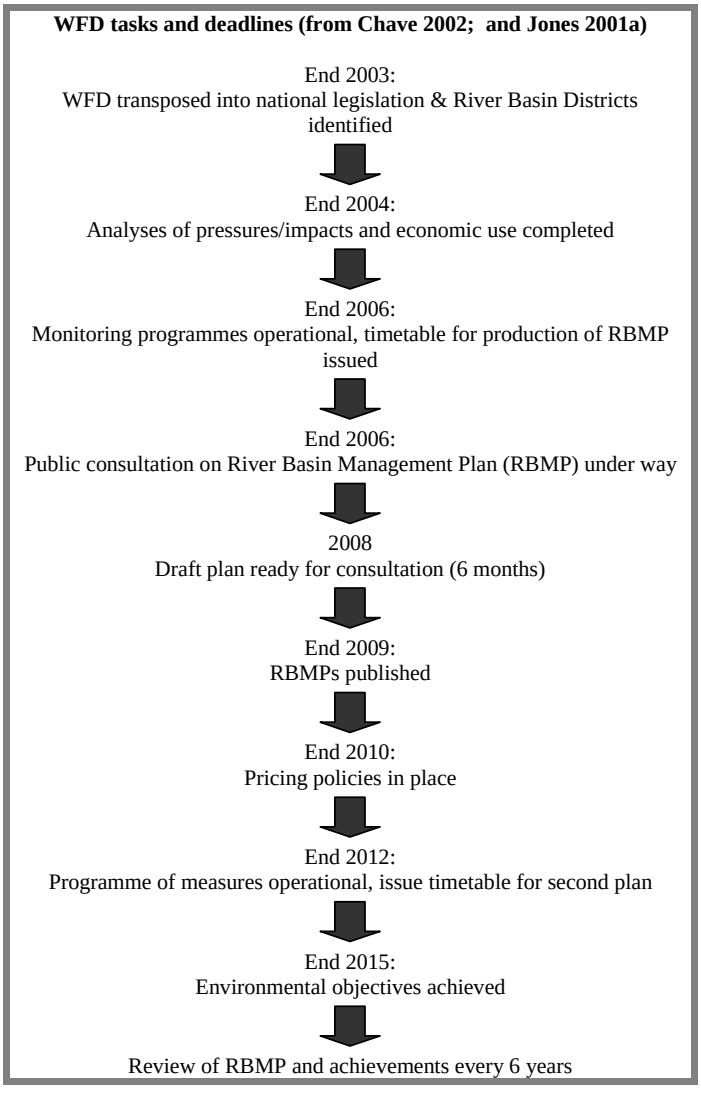
Implementation of the directive should be carried out so that measures complement actions under the Habitats Directive (Council of the European Communities 1992) and Integrated Pollution Prevention and Control Directive (IPPC) (Council of the European Communities 1996). One aim of the directive is to encourage sustainable water use through changing pricing structures to reflect full cost recovery of the price of supplying and using water, following a 'polluter and user pays' principle (Morris 2002).

One drive for integrated planning in the WFD is the requirement for creating catchment plans, based on River Basin Districts. Organising environmental planning around River Basin Districts represents a significant shift to a regional scale of governance. Historically regional planning has been relatively weak in the UK compared to countries such as Germany and Austria, but programmes of devolution and regionalisation in the late 1990's are beginning to create a more democratic and powerful tier of government (Selman 2000). This drive has been given impetus by the European Union's emphasis on subsidiarity. As a countervailing force to standardisation, there is an emphasis on the distinctiveness of local places, and the need for conservation. Finding an appropriate level of scale for managing environmental resources, and matching this with an appropriate level of scale for engaging effective local participation, will be a major challenge in terms of delivering this directive. The issue of integrating management across different levels of scale is discussed in more detail in Chapter 4.

Not only are the overall aims of the WFD ambitious, the timetable for delivery is challenging. Figure 2-1 shows the minimum dates for compliance with the major tasks of the WFD.

Shifts in European Policy have taken place within a context of changing ideas of government. Governance, a process of facilitating partnerships and enabling actors to implement policies, is seen as the role of governments, as opposed to acting directly to impose the provisions of plans and policies. This shift is reflected in changing attitudes towards environmental protection.

Figure 2-1 Minimum Compliance Deadlines for the WFD



In Britain in the 1980's, governmental mechanisms for determining the use of natural resources shifted from a centralised, *'command-and-control'* approach, to a more *'enabling'* approach, which favours incentives and greater flexibility. A more market-based approach to encouraging behaviours, through monetary incentives and disincentives, such as grants and taxation, is becoming favoured (Selman 2000).

Bureaucratic departments have traditionally been organised around particular functions, such as agriculture or transport, with a high degree of vertical integration, but few functional links between departments. Such an organisation is effective in terms of

delivering single objectives in policy, for example, increased agricultural production. The realisation of the interlinked nature of problems arising from the sustainability debate, however, has resulted in a call for increased integration between departments. This is seen as important both in order to resolve cross-cutting problems, and to develop plans and policies which deliver multiple objectives, with minimal negative unintended consequences (Selman 2000). The creation of RBMPs can help to develop such cross-sectoral working.

The Common Implementation Strategy (CIS) represents a new approach to implementing European policy. The overall objective is to allow *"a coherent and harmonious implementation of the framework directive"* (European Commission 2001b, pg. 4). It aims to develop dialogue around the process of implementing the WFD, engaging stakeholders in this discussion and developing capacity amongst member states to deliver this ambitious policy (Jones 2001a). Such an approach is seen as necessary to help develop coherence between the WFD and other policies and directives, such as the SEA Directive (European Commission 2001a), and to cope with the transnational nature of river basins in many Member States and candidate countries. Key activities include: sharing information, developing and testing guidance and coordinating and managing data and information (European Commission 2001b).

In order to achieve the ambitious goals set by the directive changes will be necessary not only in the water sector, but also in urban planning, industrial design, architecture, agriculture, infrastructure planning and landscape management. This will require an innovative approach to planning.

2.3.1 Participation and the Water Framework Directive

> *"The theme of holistic regeneration for sustainable development demands new ways of planning and managing urban activity. And the concept of 'planning' itself needs rethinking" (Ravetz, J. 2000, pg. 226).*

The ambitious objectives of the WFD and its requirement to engage participation in planning imply the need to focus on the *process* of participation. In a WWF seminar on the WFD involving key leaders in the field of river basin management, two sessions on participation had been considered to be sufficient. During the event, however, questions

about how to mobilise effective participation, and discussion of how central this mobilisation was to the success of the WFD, emerged in each session over the two-day period. This was seen as the *"dominant theme to emerge from the Seminar"* (Jones 2001b).

The ambitious nature of the WFD's ecological and environmental objectives implies the need to engage participation of many stakeholders and actors early in the planning process. This facilitates development of programmes of measures that are likely to work in the context, and have the support of the stakeholders who need to carry them out.

Active involvement of stakeholders in developing options and plans on this scale is still uncommon. Even in the Netherlands, where innovation in participation has a long pedigree, *"actual participation of stakeholders in design activities in infrastructure or spatial planning is rising… but in these examples the design activities are limited to details, after the major choices in design have been made"* (Enserink and Monnikhof 2003, pg. 323). The ecological requirements of the WFD are comprehensive, and will require that planning takes into account ecology and environmental impacts at every level, implying a need to look at the ways that participation can help to encourage ecological planning.

In the context of participatory planning, this research has identified five inter-related challenges posed by the ambitious targets of the WFD. These are summarised as the need to:

1. enhance integrated planning;
2. go beyond 'end-of-pipe' to eco-systemic solutions;
3. encourage meaningful participation;
4. develop capacity in stakeholders and planners to meet the above challenges;
5. and link actions and measures across multiple geographic levels of scale.

These challenges are explored in more depth in Chapter 4. This research aims to develop both the theory and understanding of the practical application of meaningful participation, in the context of 'planning for sustainability'. This chapter has explored the historical background to Integrated Catchment Management and described key issues raised by the recently enacted Water Framework Directive. The following chapter sets out the research methodology.