



INTEGRATED CATCHMENT MANAGEMENT: IS IT WISHFUL THINKING OR CAN IT SUCCEED?

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ABSTRACT

The need for better and improved water resources management has been echoed time and again worldwide. In South Africa, where water has been identified as a scarce resource and a limiting factor for development, the situation is even more critical. To address this problem, management of water on an integrated catchment basis has been applied to various catchments in the country. The development and implementation of this approach offered managers unique learning experiences. They had to contend with complex water resource problems as well as with economic and political difficulties. On the one hand it was a very exciting and challenging experience, on the other hand success was limited and in many cases the results were disappointing.

In this paper, the approaches adopted and the experiences gained in the execution of more than twenty major catchment management projects, as well as various issues impacting on the outcome of the projects, are highlighted. It is important to realise that this approach is in a development phase and still requires time and energy to become a meaningful management practice.

KEYWORDS

Failures: implementation process; integrated catchment management; participatory management; successes.

INTRODUCTION

Managing water resources is becoming increasingly complex. In South Africa, it is especially challenging. This country is a unique confluence of First World, Third World and developing cultures, with different aspirations, standards and value systems. Strong focus is placed on social upliftment as well as on economic growth and development, all of which have to be supported by effective resources management, with water resources management as a major function. Unfortunately, South Africa is not well endowed with abundant fresh water resources. Fresh water in this country is regarded as a scarce resource and a limiting factor for development. The situation is further complicated by the fact that the quality of these resources is deteriorating.

Managers are currently rethinking the way they manage the country's water resources, due to growing pressures. These include: the growing complexity of the situation and problems that need to be addressed; the rate of change taking place; the need to address neglected social and environmental requirements; the need to resolve conflicts in water allocations; the need for interbasin transfers; the need to cope with severe

droughts; as well as the need to ensure that water resources are managed on an intergenerational sustainable basis. The traditional approaches to managing water with concrete and bulldozers, and water quality by only addressing point sources of pollution, have already been proven to be insufficient.

During the early eighties, an integrated catchment management approach was adopted to address water problems in various catchments in the Eastern Transvaal and Northern provinces. Between 1985 and 1989, eight major catchment management projects were initiated. To address the threats to water quality in South Africa, the Department of Water Affairs and Forestry adopted a new approach to water quality management in 1989, with integrated catchment management playing a central role. Since 1992 more than 14 major catchment management projects were initiated and various others identified, to address water quality problems, and to gain experience in using this approach to manage different water resource situations. Various independent catchment studies were also initiated over the last 15 years by consultants and other authorities. The development and implementation of most of these projects offered managers unique learning experiences. They had to contend with complex water resource problems as well as with economic and political difficulties and pressures. Much had to be learned very quickly about managing change – with no guidelines, no handbooks, no experiences, no proper institutional structures to facilitate actions or legal support. On the one hand it was a very exciting and challenging experience, on the other hand it was very difficult with many obstacles and disappointments.

IT MAKES SENSE

The approach to managing water on a catchment basis, integrating the hydrological system with natural features, land-use, runoff, water use and water quality, makes sense. The interdependence of land and water in terms of land-use being a water user on the one hand, and an impactor on the other is obvious. A multitude of land and water problems such as water quality degradation, impacts on groundwater and health hazards are produced in the wake of land-use development.

It therefore seems obvious that water resource management can only be effective if all authorities who share land-use development control and water managers are co-operating. This means that there should be clear communication and role definition between the various managers and impactors and proper recognition of users and their requirements. The application of the "polluter and impactor pays" principles emphasizes the need for the acceptance of roles and responsibilities toward water and environmental management by all land users and managers. This, together with the fact that water is shared by different user groups with different requirements, by different states and governments, stresses the need for effective co-operation and co-ordinated management. It also points out the importance of a strong central co-ordinating body, which must be supported by proper hierarchical institutional frameworks to facilitate efficient management. This in turn requires vertical integration of water resource management from central government down to ground level, as well as multilateral integration of actions and management between governments, state departments, supply agencies, users and impactors.

To succeed in managing a semi-arid, semi-industrialised, multicultural country with developed and developing communities, such as South Africa, managers must be in a position to see the whole picture, understand the resources, the customers, their needs and aspirations and to make wise decisions in the interests of all. This requires a holistic approach to management which integrates skills in engineering, economics, politics, social and environmental management. It involves the bringing together of various disciplines and the compilation and development of multidisciplinary teams of champions. Due to the unique site-specific character of water resources in terms of physical properties, specific land-use and people involved, it is not feasible to manage the countries water resources on a national basis without basing it on logical management units. Because we are dealing with a natural resource, driven by the hydrological cycle, it makes good sense to use river catchments as such units.

INTEGRATED CATCHMENT MANAGEMENT – WHAT IS IT?

Integrated catchment management is easier said than done. Although the need for it has been widely promoted and the concept has been accepted by various countries, until lately not much was said or was available on "how to make it happen" and – very important – "how to ensure sustained integrated catchment management". In assessing various handbooks, conferences, reports and papers on this topic, it became clear that one of the main problems was the lack of definition of the concept "water management". For most people it means water resources development, that is, the building and operation of dams and/or the issuing of abstraction and quality control permits.

The concept "integrated catchment management" is even more difficult to define. For many it merely means the execution of catchment studies, also known as situation or need assessments and problem identification. Until recently integrated catchment management seemed to be limited to data collection. The majority of applications were focused on *ad hoc* and single purpose developments, using the catchment approach for hydrological and water quality modelling and limited one-sided catchment thinking to facilitate impact assessments.

One of the results of these narrow-minded approaches was that hydrology became a dead concept. Rivers became lines on maps and flow became yield figures on tables and reports. The introduction and development of systems analysis, whereby water supply and risk could be evaluated in a regional and stochastic manner, was a major breakthrough in water management. Unfortunately it concentrated on nodes (major abstraction points), ignoring low flows and instream requirements and focusing mainly on supply and off-stream demands. Some Americans describe it as systems engineering and not management. In trying to cater for the environment, the Integrated Environmental Management procedure was developed. Although it was (and still is) an important facet of water management, this was only an impact assessment procedure and not management as such. It did not supply decision-making criteria for what the impact would be and what was good or bad. The major obstacle was the lack of a decision-making framework against which a proposed development could be assessed.

In trying to implement the approach in 1985, there also appeared to be many other problems. Management was still very narrowly focused with the result that many aspects, especially developing communities, the natural environment, aesthetics and recreation, had been left out in the cold. Engineers, as valiant and competent technicians, set out to curb a stream – and to harness a recalcitrant nature – and could be guilty of forgetting that the river in itself was an important asset. Scientists, in their search for answers, became very specialised and as a result turned their backs on finding integrated solutions. The problem revolved around the definition of management. Except for the term planning, management concepts such as leading, organizing, control, entrepreneurship, marketing, communication, team building, implementation, negotiation, performance auditing, success evaluation, people empowerment, client and customer service, were virtually non-existent in water management terminology.

MAKING IT HAPPEN

The lack of clarity as well as conflict and misunderstanding between managers on what was meant by the concept "water management", had a major impact on the implementation process. The only resolution was to go back to the drawing board and define management from basic principles, using business management as the base reference. The first step in management was planning, and the first step in planning was to know where one wanted to go and what should be achieved. In assessing the situation, it was interesting to find that in most cases there were no clear objectives for water resource management. It seemed that everybody accepted that "somebody somewhere" set desirable aims and goals towards which a system should work, and that this "somebody" was endowed with sufficient information, intelligence, power and leadership to make the right decisions and to make it work. This was a fallacy.

To enable effective management and to ensure joint focus between all parties concerned, it was deemed essential to have clear goals and objectives for the management of the catchments and water resources. To

guide catchment planning and management, focus was placed on "the care of human life, health and dignity and the creation of wealth and well-being, thus ensuring sustained quality of life", giving the natural environment, recreation and aesthetics improved status. The acceptance of this common goal, as well as the application of business management principles, opened a whole new ball game in water management. This resulted in the development of a project model that consisted of the following actions.

Action 1: Know and understand

Customer and client. This entailed the identification, characterization and understanding of each client with special emphasis on their location, physical, social and economic status and needs as well as their attitudes and behaviour.

Water resources. Understanding the water resources, their runoff and flow characteristics, their development status and potential, water quality status, assimilative capacity, yield characteristics, environmental status and qualities and use.

Physical characteristics. Understanding the role of hydrology, soil, geology and climate in terms of runoff, yield, water resource development, water quality and land-use development.

Land use. Understanding and relating land use, infrastructure and development to water use, impacts on and relationship to water management.

The water resource as a system. Integrating land use, water use, impactors, hydrology, groundwater, rivers, estuaries and the coastal marine environment.

Driving forces and impacting factors. Identifying and understanding the roles and impacts of social, economic, political, legal and environmental forces on water resources management.

Management and institutional systems. To understand why certain actions are happening or not happening, to make things happen, as well as to allocate roles and responsibilities, it is very important to understand existing and potential management and institutional systems.

The environment. To ensure a healthy and acceptable environment, it is important to understand it, its importance, its functioning, its role and value systems.

Action 2: Participatory and people management

"Leadership has a harder job to do than just choose sides. It must bring sides together".

Jesse Jackson

Integrated management means different people or sectors with different personal objectives working together for a common goal. It also means the acceptance of the principle of empowering role players and people on the ground to participate in management and for them to accept roles and responsibilities for their actions. By accepting the principle of joint responsibility, the concept of participatory management developed a new meaning. It moved from informing the public on an *ad hoc* basis to include multilateral communication, to advising, negotiating, facilitating actions, blessing, sponsoring and funding, understanding and approving, as well as accepting roles and responsibilities. This led to the implementation of improved communication, training and education, capacity building, conflict management, creation of positive climates for negotiation, co-operation, team building, trust, the development of common value systems as well as marketing. Much attention and time went into planning how to get people involved, breaking down barriers and making people part of the team.

Techniques applied in the coaching of super sport teams, had a major impact on the development of this approach. To be a professional team player you not only needed to know the game, the playing field, and the

rules, but you also had to be fit and have basic and special skills. The most important factor, however, was that team members had to understand each other and have the will and drive to win! The acceptance of the abovementioned philosophy implied the need for intensive coaching, motivation, hard training, organizing and very important – the players and spectators also had to enjoy it!

Action 3: Sustainable planning and management

"Don't cross the bridge until you come to it, (but) be sure there is a bridge".

Anonymous

This action consisted of three sub-actions.

Physical planning and management. The focus of this approach was to integrate and balance water supply, demand, development and impacts. The objective was to make the best use of the water resources and to manage and develop infrastructure to serve all clients in the best and proactive way. On the one hand it was about addressing existing problems, but more so about anticipating the future and planning for the most likely events to happen and risks to be expected. It was about satisfying customer needs while ensuring a healthy sustainable resource and environment.

Business management. Business management focused on many known actions which in the past had been taken for granted or totally ignored. By accepting this approach, focus was not only placed on the physical side of a catchment or project, or planning a scheme on paper – it forced the planner to also develop objective strategies to ensure "the happening of" the scheme. This involved planning and overseeing the implementation actions, allocating roles and responsibilities, acquiring, approval and funding, ensuring sustainable construction, operation and maintenance, designing and implementing control functions, performance auditing and monitoring, adherence to legal requirements, institutional aspects, co-ordination, communication, organizing and the development of information systems.

Addressing short-term action and problems. Through focusing on people and their requirements, it became clear that to ensure their support and co-operation while maintaining a positive standing in the community, much attention had to be given to addressing immediate problems and needs. The delivery of products in the short term also served as "carrots" to get people committed and involved.

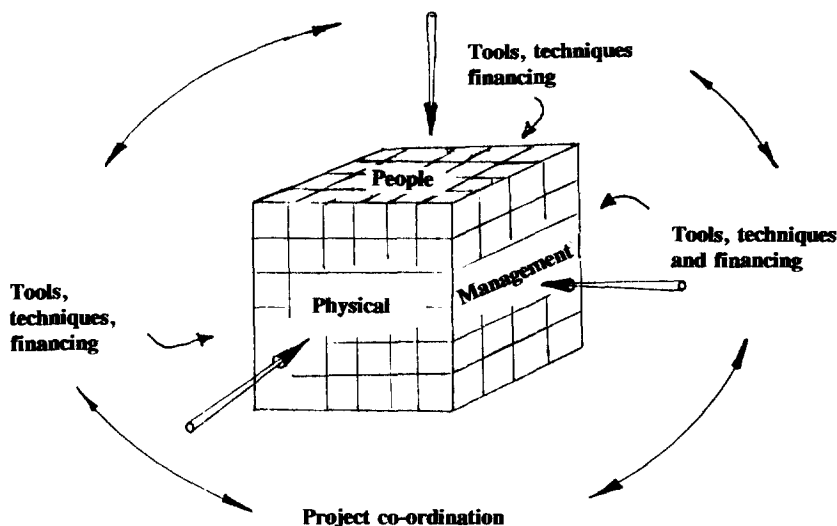


Figure 1. Multidimensional matrix management model.

As defined, integrated management demanded a comprehensive co-ordinated function. In practice, it could be described as being a multi-collaborative action between different parties, sharing the same resource for different purposes and impacting it in different ways. The best way to model this complex relationship was to use a matrix management concept. To facilitate multiparty and sectoral team management a multidimensional matrix management model system was developed (Fig. 1).

Although more complex than shown, this concept illustrated the integration principle with the cube representing the catchment system with multidimensional relationships between the resource and its characteristics, land use, management activities and people. It also demonstrated the different directions in which various aspects were linked and focused. To maintain an integrated package, the individual cubes had to be bridged and bonded together to ensure a stable system. The successful bonding of the different elements depended heavily on leadership and coaching. This demanded a strong project leader, an integrator who had to stand with a foot in each element, somebody who had to be knowledgeable about each of the areas which had to be bridged, a special person who was respected by all parties, and of acceptable status. To get things done he and his team had to be skilled in interpersonal relationships, communication and entrepreneurship.

Much attention was given to actions and aspects which would ensure the successful implementation and ongoing management of the projects. A major concern was that most of the studies would end up as planning reports gathering dust on shelves. A key point of departure was that the "know and understand" action was not just a data gathering exercise, but a key to understanding the customers, the resource, the operating system and the environment. The main objective was that it should result in user-friendly manuals to:

- facilitate understanding of the system as a whole but also each individual component;
- serve as educational, training and communication material to enable effective participatory management;
- identify problems and needs as well as their solutions for action;
- facilitate effective and efficient physical business and people management;
- serve as a reference framework for impact assessments and decision making.

To gain experience in the management of integrated catchment projects, various implementation approaches were followed. In some cases more attention was given to the "know and understand" component and less to the "participatory" side. In others, a balanced approach was followed. With some, more focus was placed on "participation". The water quality projects ranged from heavily polluted catchments to less polluted but threatened areas, from environmentally sensitive areas in good condition to difficult catchments with complex problems. The process of implementation consisted of the following actions:

- the identification of key management areas and associated role players;
- the acquisition of funding;
- the identification and development of champions with vision, energy, drive and leadership to steer the whole project;
- the establishment of executive management and steering committees as well as various working groups;
- the appointment of multidisciplinary consultant teams;
- facilitation of public participation and team building;
- the creation of a climate for understanding, negotiation and team building;
- the development of tools such as models, impact assessments, decision making and assessment criteria;
- training, education and marketing actions;
- the development of a geographical management information system; and
- the development of an integrated planning process.

IT WAS FUN

The feeling experienced when one really started to understand a system and how it worked, was incredible. Everything started to make sense and complex problems became simple and understandable. Getting people together from different cultures, backgrounds and attitudes and transforming them into a joint and positive team was like winning a test match. The whole process was a learning experience of thinking, listening and doing. Suddenly everybody wanted to be part of the team. Hydrology became a living concept, with droughts, low flows, bigger flows and floods being part of the system. It had velocity, depth of flow and an aquatic environment to support.

As a result of these studies, many user groups and concerned parties for the first time started to understand their situation. A good example is that of the Wilderness Lakes, which are controlled by the National Parks Board. With the combination of a wilderness area being a Ramsar site (selected according to the Ramsar Wetlands Conservation agreement) managed by an environmental authority, everybody expected that the goal was to maintain the habitat of a unique natural environment. This was not so. The driving force was to control floods and safeguard properties of land owners who developed too close to the water's edge. Only a limited effort went into maintaining the system as a unique heritage site. Another example was the predicament of game reserves in the Eastern Transvaal. In the Sabie basin, where game reserves occupy nearly 40 per cent of the catchment area, less than one per cent of the annual runoff is generated from these areas. In terms of their water requirements they are totally dependent on the upper 15 per cent of the catchment, where all the low flows and 85 per cent of the mean annual runoff are generated. Before the studies started, no structures existed to allow these groups to negotiate for sustained allocations and integrated management.

Other major actions which also resulted from these projects.

- the development of a new approach managing people and communities;
- the acknowledgement of the natural environment as a legitimate user;
- various revisions and improvements of hydrological models;
- the development of water quality models;
- the establishment of the Kruger National Park Rivers Research Programme;
- dramatic revisions of the yields of various dams and systems;
- the development of groundwater potential maps;
- the focusing on optimal and efficient water use as an alternative to water resources development;
- the development of water quality guidelines;
- the development of multicriteria decision support systems to enable water managers to allocate water;
- the establishment, development and use of geographical information systems;
- improved liaison and the establishment of liaison forums between different states and authorities;
- the identification of various water resource development options which would serve all the clients in a positive and holistic way;
- the support forthcoming from communities and all sectors was staggering. Different authorities competed to host the different steering committee meetings, site visits, social meetings and team building functions. Various voluntary actions were forthcoming from industries to improve the quality of their effluent and to meet water quality objectives;
- more clean-up actions, competitions, water days and sponsorships were taking place;
- the revision and development of a new afforestation management and permit system; and
- the development of goodwill and co-operation between competing groups and sectors.

The identification and appreciation of the social needs of neglected developing communities was a real eye-opener. In most cases, it was clear that the approach was an overwhelming success and that the majority of the communities and sectors supported and appreciated the action.

IT WAS WISHFUL THINKING

In spite of the successes achieved, integrated catchment management seems to be a "no go" in South Africa. At the time of writing this paper only five projects were ongoing. Most of the projects were terminated or in the process of being terminated. The majority of the projects ended after only completing the "know and understand" phase, leaving "participatory management" in the midst of nowhere and many actions incomplete. It was a disaster, mainly due to a lack of funding. The question that was asked, however, was whether the approach really had the political and management backing to guarantee ongoing financial support. This focused attention on the lack of appreciation and understanding of catchment management.

Many managers did not know what was going on around them, or had any experience in managing change and thus appreciation for the process needed to manage complex situations. Their interests were still very narrow and their views so fixed that they could not recognise opportunities when they saw them. Many could not commit themselves to serious action and only paid lip service to the concept. To study a problem or situation is one thing, but to make it work is another.

As Roger Evans and Peter Russel put it, "Many of us may have had the insight into the joy and beauty of life, but it may take months of hard work before that insight can be conveyed into the words of Blake, Wordsworth, Emerson or Shakespeare." Implementation is a stage where skills, training and experience, tools and resources are of prime importance. It takes time to negotiate. Building up teams of able and committed experts demands a lot of energy. Managing a team is an ongoing and demanding process, with frustration, learning and breakthroughs. People don't usually come together as a team immediately - they need an initial period of preparation and settling in, as well as time for coaching and motivation. To get team members actually involved and to facilitate insight and breakthroughs needs a receptive environment, which has to be created. Many a study was terminated before this could be achieved. The situation became a nightmare.

Major expectancies were created which ended up as wasted dreams. This resulted in anger, as well as the development of very negative attitudes and distrust. This situation caused a lot of frustration. Attitudes were a serious problem. Many statements such as: we do not support it; it is too complex; it is a waste of money; it is not for me; it is a waste of time; it is not my responsibility – were the order of the day, mostly coming from managers feeling threatened by the process. Major efforts went into overcoming this problem, but it backfired and became worse.

Other problems experienced should be noted.

The lack of competent champions to steer and drive the projects. Many studies could not be implemented and some had to be terminated due to the scarcity of skilled project managers. The lack of competent and skilled co-ordinating consultants to steer multidisciplinary teams, to facilitate participatory management as well as to assist with the development of complex management strategies, also created problems. Where they were available, manpower was stretched and over-committed.

Lack of interest. Two years ago a specialist group on integrated basin management was established in South Africa. Until now, less than twenty people have joined the group.

The inability of specialists (for example environmentalists who in principle supported the approach) to focus, to understand the urgency of the problem and thus to contribute and deliver products in time. This also applied to computer specialists who regarded geographical information systems as tools to produce maps and not as key management support systems.

The lack of a proper institutional dispensation to ensure and facilitate effective integrated catchment management. This complicated the process in many ways.

Security and political problems also confused the issue in many cases.

A further problem was the uncoordinated silent development which was (and still is) taking place with dramatic irreversible negative impacts. The reason for this could largely be ascribed to the lack of urgency and commitment to get co-ordinated and integrated management of the ground. There was also a lack of protocol, structure and leadership. One of the benefits of the integrated management process was that this silent development was anticipated and predicted. However, it received limited attention.

The hesitation and air of despair are supported by recent developments and statements made overseas. After the initiation of so-called integrated or unified river basin management in the United States more than twenty years ago, the concept of integrated management has to date not really got off the ground and actions such as Water Quality 2000 are only now seriously pursuing this principle. It appears that much attention was devoted to physical planning but limited progress has been made in catchment "management". This also applies to Agenda 21, the World Bank, development in the United Kingdom and countries such as Australia.

CAN IT SUCCEED?

The integrated management concept is a relatively new approach to managing water resources in South Africa and an associated culture has yet to develop. Despite all the problems, integrated management still makes sense and is the only sensible option. If applied deliberately, it will meet the requirements of people for empowerment, co-operation and transparency. To make it happen, the approach to managing water resources will have to change drastically. It must become more people-centred and environmentally focused, and ensure sustainability. More attention must be given to business principles. This will require a cultural change within the management sphere. It should not be a task-driven action (being a project) but must become a lifestyle. It has more to do with people and motivation and less to do with physical management than one would think. This is not implying that the physical side of the cube should be ignored. It demands a complete approach.

In South Africa a golden opportunity exists to facilitate this change as part of the Reconstruction and Development Programme. However, it will not happen if there is no political and management acceptance of this approach, or the desire and drive to make it happen. This must be supported by competent champions to steer and drive this process. Unfortunately, there is a total shortage of such champions and a concerted effort will have to be made to develop and cultivate competent managers in this field. It also has to be supported by effective administration and legislative backup. This will take time to establish.

Fortunately, the principle of integrated catchment management has gained a lot of ground and is receiving wide recognition. If we accept the seed has germinated and is in the process of establishing itself, the way forward now is to nurture and guide the process. We have to accept that we are still in the learning and developing phase and therefore should not give up hope.

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