

Avon-Heathcote Estuary / Ihutai — the application of Integrated Environmental Management to recover biodiversity

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ABSTRACT

Outlining a successful community-based approach towards non-statutory management of a significant urban estuary environment.

The city and regional councils have combined to facilitate a community process to address issues relating to the Avon-Heathcote Estuary / Ihutai. The community has identified that its preferred approach is to develop and implement a non-statutory management plan for integrated environmental management of the estuary. A trust has been established to oversee this process.

The goals of the integrated environmental management approach include:

- Communities working together for the betterment of the estuary
- Clean water is assured for healthy ecosystems
- Management and development of open space
- Promote safe and balanced recreation
- Healthy ecosystems.

This has been a unique approach to addressing issues of community and environmental pressures on a distinctive urban ecosystem.

INTRODUCTION

The Avon Heathcote Estuary / Ihutai (the Estuary) is the largest, semi-enclosed shallow estuary in Canterbury, and remains one of New Zealand's most important coastal wetlands, despite being almost totally surrounded by residential housing suburbs of Christchurch City.

At 880 ha, it is relatively small, smaller than it used to be in storm and flood conditions in early Christchurch. Its size however belies the value it has held and still holds as a place special to people as mahinga kai (a place to gather

food), for its rich variety of birdlife and fish, as a recreational playground and educational resource, and as a 'kidney' for the adjacent city.

It is this diversity of purpose and function that has caused what has been seen by some as management for inappropriate values, leading to a general decline in many of its biodiversity values.

This paper looks at an integrated management framework, which is in its early stages, and how

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² Editor's note: now known as the Greenspace Unit.

it is being applied to the Estuary so that some of its past biodiversity values are restored.

NATURAL ENVIRONMENT — THE ESTUARY THEN AND NOW

The Estuary as it currently exists is estimated to be approximately 450 years old (Cromarty & Scott 1996). At an average depth of 1.4 m, it is bounded on three sides by greatly differing landforms — to the south lie the volcanic and loess-coated Port Hills, with wetland areas to the west and a sandspit to the east protecting it from the open sea. Historically, wetland complexes dominated the immediate catchments of the Avon and Heathcote Rivers. Today they are dominated by asphalt and housing, greatly increasing the sediment fluxes and urban contamination of water columns in various ways.

Wetlands bordering the western Estuary were dominated with raupō and New Zealand flax (*Phormium*) and the higher areas with tussock, fern and tutu (*Coriaria*). These areas have been drained to make way for dump sites, a sewage farm (historically) and over recent decades, a wastewater treatment area for the adjacent city. The effects of these developments and ongoing discharges have perhaps been the most fundamental to the Estuary. Monitoring has shown increases in heavy metals found in both sediments and shellfish, increased nutrient levels leading to ‘blooms’ of sea lettuce, increased freshwater levels, with changes in pH and increased ammonia. Microbiological monitoring has also demonstrated sustained pollution of estuarine water and adjacent Sumner beaches.

Stories from the early century recount lush ‘paddocks’ of sea grass (*Zostera*) growing between the channels and shore (Owen 1992). These areas were the basis of a thriving eel and shrimp fishery, and some 34 species of fish have been identified. Evidence presented at the hearings for continued wastewater discharge to the Estuary suggests fish decline due to increased ammonia levels (Batcheler 2002).

Both in the past and at present the Estuary has had a large and thriving bird population. As part of an important coastal network of wetlands, in the last 150 years at least 113 species of birds have been recorded (Owen 1992). Being regularly or occasionally visited by inter-continental migratory species, the estuary is internationally important, perhaps on its own meeting the criteria to be registered as a Ramsar site³. The bird populations are one of the Estuaries most widely recognised ecological features.

SOCIAL AND ECONOMIC ENVIRONMENT — THE ESTUARY THEN AND NOW

People have lived beside and utilised the Estuary for hundreds of years as a highly valued food gathering site. ‘Suburbs’ of resource were recognised and utilised according to time and place: flounder off the eastern shore, eel at the mouths of the rivers, flax reserves for weaving.

European settlers also recognised this kind of ‘value’ of the Estuary and a thriving fishing village established in the Redcliffs area.

While a plan to dredge and develop the Estuary as a port never eventuated, the value of trade using the Estuary and rivers to access the growing city was put at 700 000 pounds sterling in 1860 (Owen 1992).

Popular for the last 120 years as a recreational sailing area, the Estuary is now home to three yacht clubs and a variety of other water and land-based activity including windsurfing, kite surfing, sailing, kayaking, fishing, walking and birdwatching.

The Estuary and adjacent wetlands have also been highly valued by the adjacent city for the dilution values of tidal water. Discharges into it come from industry (mainly via the Heathcote River), as urban stormwater, and as wastewater from the adjacent treatment plant and oxidation ponds (themselves gazetted as a Wildlife Refuge in recognition of the large numbers and diversity of birds they support).

³ Editor’s note: a convention on wetlands, signed in Ramsar, Iran in 1971. An intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

MANAGEMENT REQUIREMENTS OF THE ESTUARY

Typical natural resource management tools (those that are disjointed, reactive) cannot be effectively applied here or to any other catchment-based environmental problem (Born & Sonzogni 1995).

This is true of the current management framework for the Estuary. While the Resource Management Act (1991) has gone a long way towards integrating responses to environmental concerns, it also introduced new administrative boundaries. Such boundaries may bear little resemblance to the ecological interactions and catchment issues, which affect the Estuary. Added to the mix is the:

- Overlapping management and regulatory roles of different organisations under other legislation (Fig. 1)
- Lack of clarity in cross boundary areas (such as around the high tide line)
- Confusion amongst the public about who is responsible for what
- Competing demands placed on the already delicately balanced estuarine ecosystem: play

area, food source, and outlet for stormwater and wastewater.

This kind of situation results in each institution developing its own resource management strategy for a narrow or limited purpose, which often conflicts with other strategies that were developed by other specialists with different perspectives (Cairns 1991).

The community at large has been advocating for changes in the way the Estuary is managed for a considerable time. Since the Combined Estuary Association was formed in the early 1970s, there have been repeated calls for change ranging from the establishment of a separate Estuary Authority to manage the Estuary through to designation of the whole area as a Wildlife Management Reserve.

Since the early 1990s a series of public meetings, workshops and seminars have been held to examine issues surrounding the management of the Estuary. Some of the clear messages which have come from those meetings are a strong desire by the community

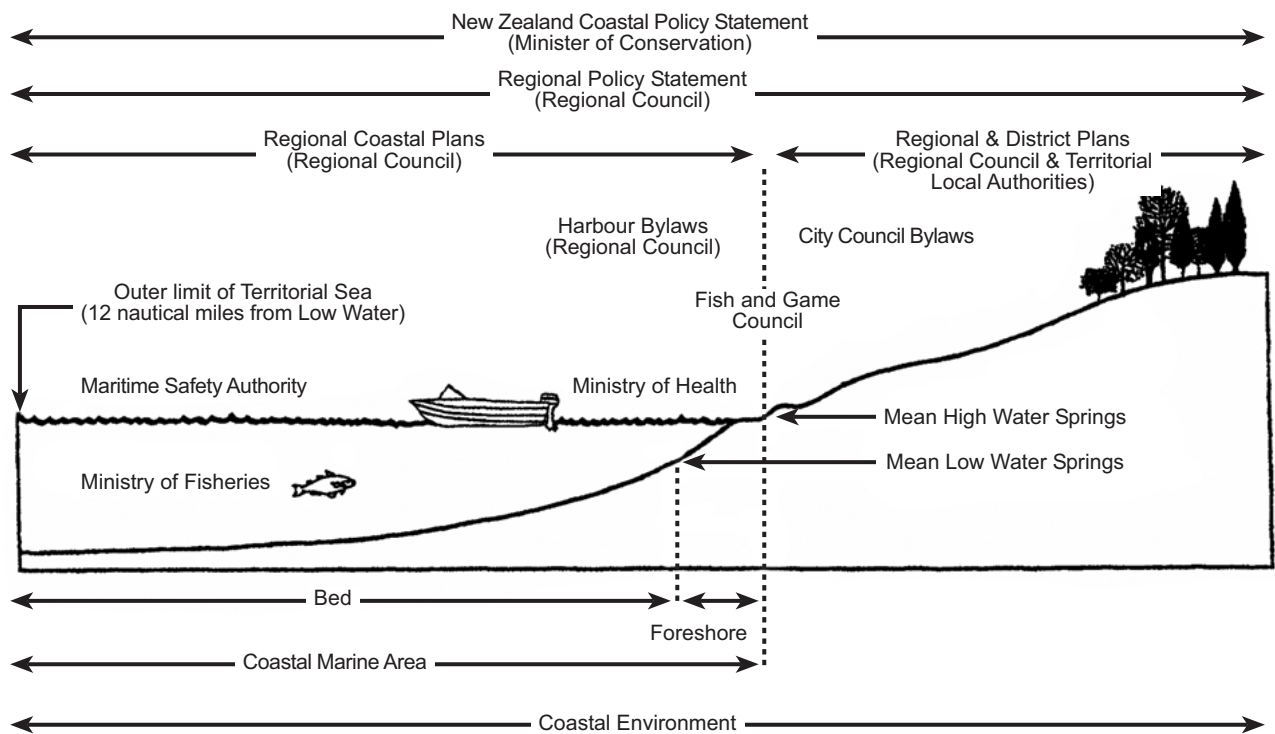


Fig. 1 Jurisdictional boundaries of agencies with statutory planning authority for managing the Avon-Heathcote Estuary. (Adapted from the Canterbury Regional Council Proposed Regional Coastal Environment Plan).

for greater input into management and a 'swing of the pendulum' away from more exploitative uses and their effects (treated wastewater and stormwater disposal, land reclamation) to cleaner water, healthy ecosystems and a valued recreational and educational resource. Without being clear or explicit about specific concerns for biodiversity, the public mood has been for recovery or restoration of some kind of naturalness, in the benthic communities, the plant life, and fish and bird life.

It might appear from the above comments that the authorities have been sitting on their hands and doing nothing to improve management of the Estuary. CCC and ECan have each undertaken a number of projects to lessen impacts and increase communication, including:

- A number of upgrades of the wastewater treatment plant (discharge to the Estuary is planned to cease in 2009 in favour of 3 km offshore pipeline discharge of treated wastewater)
- Development, maintenance and enhancement of reserves along the edge of the Estuary including saltmarsh creation and restoration and wetland plantings
- Some increase in removal of sea lettuce residues
- Development of island bird roosting areas (McCormacks Bay)
- Implementation of a draft Coastal Plan setting water quality standards and speed limits for powered water vehicles
- Various monitoring and surveys (water quality, sediments, heavy metals, and structures)
- Regular staff working group meetings and the joint authoring of an issues and options document (Scoon 2001) suggesting that a non-statutory management plan be put in place for the Estuary.

A more integrated approach was what was being called for, a move away from a command and control approach to one that is about enabling, facilitating and inclusion. This call coincided with a shift in the way local government worked with communities on environmental issues.

The community, interest groups, local authorities and mana whenua established a working party to look at how integration might occur. From this work a trust was formed, with the concept of Integrated Environmental Management (IEM) at its core.

O'Connor (2002a) who was a party to this working group describes IEM as a 'process for involving communities in understanding and managing resources in their environment that exist as complex ecosystems'. Margerum & Born (1995) define the process of IEM as goal focused, inclusive, interconnected and strategic.

WHY DO WE NEED INTEGRATED ENVIRONMENTAL MANAGEMENT?

When we consider the environment as an indivisible whole, it means the environment cannot be split into self-contained spheres, areas or compartments (Bührs 1995). Therefore, the occurrence of a single event in an area of an environment may lead to repercussions throughout that environment (Bührs 1995). This is even more apparent when applied to a catchment scenario. It is easy therefore, to see why environmental problems are complex, multi-faceted and interconnected in nature (Bührs 1995) and the Estuary is no exception.

IEM is an approach based on 'a systematic effort to understand, through interactive interpretation and analysis, the linkages between ecosystems, resources and peoples' (O'Connor 2002a). It is therefore an essential approach for the restoration of integrity when any complex environmental system has to be changed or modified in one or more of its compartments. Such change is inevitable in civilisation.

When the process of IEM is applied to a problematic environmental issue such as affects the Avon-Heathcote Estuary, IEM brings to the forefront and recognises people's wants of the estuarine system, what each want costs other people, and what those collective wants cost the estuarine system (O'Connor 2002a) within the framework of the estuarine process. This recognises that an estuary in a city is not simply

a natural ecosystem, but a cultural system as well, and nonetheless an ecosystem. Like 'landscape' in its primitive meaning as 'landship' (Swaffield & O'Connor 1986), communities of people are recognised as integral components of such ecosystems.

Biodiversity — like kite surfing, walkways, and dilution capabilities — are one of the many wants placed on the estuarine system. Some are complementary whilst others are in conflict. The process of IEM aims to bring together different sectors of the community so they can understand each other's diverse objectives and backgrounds with regards to a resource. This in turn should hopefully assist them address their conflicting wants more effectively (Swaffield 1998; O'Connor 2002a).

IEM can be likened to a telephoto camera lens. It enables those who care for or use the Estuary to view the larger picture, using a panoramic lens to see the Estuary in its surrounding environment, its catchment. It can then zoom in on specific wants and needs of both people and the estuarine ecosystem, enabling identification and understanding of the details of those specific wants and needs. The camera lens then zooms out again to the larger picture in order to see how those wants and needs best fit together and to assess the way to effectively resolve those issues that remain in conflict.

HOW DOES THE TRUST FIT WITH THE AVON-HEATHCOTE ESTUARY / IHUTAI?

As previously mentioned a number of public workshops and fora were held beginning in the early 1990s and becoming a real focus in 2001 and 2002. Their purpose was to gauge and receive input from the community on the issues surrounding the Estuary and the options to deal with these. To briefly and not too crudely summarise, the two key outcomes of these fora were:

1. Use IEM as the approach to ensure effective management of the Estuary and its catchments
2. That the community wanted to be involved and instrumental in ensuring IEM of the Estuary and its catchments occur.

Following that, the tremendous efforts of a working group resulted in:

- The setting of a vision for the Estuary
- A set of six objectives for a trust constitution
- The formation of Avon-Heathcote Estuary Ihutai Trust.

The Christchurch Estuary Association, which evolved from the Combined Estuary Association earlier mentioned, had been made up of representatives of groups of local residents as well as recreational interest groups. This local basis has been of great value to its role as kaitiaki or watchdog to the Estuary. To represent the greater scope of concerns for IEM of the Estuary and its catchments, the present Trust Board is made up of people representing a wide range of interests including sailing, windsurfing, kayaking, other forms of recreation, heritage, science, resource management, local community, business, education, the natural environment, mana whenua and local and national political interests.

There are six objectives of the Trust and Objectives 2 and 3 directly relate to IEM. They are outlined below:

Objective 2 — To achieve healthy working ecosystems for the Estuary and its catchments through 'Integrated Environmental Management', meaning a systematic effort to understand, through interactive interpretation and analysis, the linkages between ecosystems, resources and people.

Objective 3 — To involve individuals, community groups and statutory agencies in learning and practising the principles of integrated environmental management so that all parties responsible for the management of the Estuary and its resources apply these principles.

The Trust's vision for the Estuary is...

Communities working together for:

Clean water
Open space

Safe recreation
and
Healthy ecosystems
that we can all enjoy and respect.

Toi tū te taonga ā iwi
Toi tū te taonga ā Tāne
Toi tū te taonga ā Tangaroa
Toi tū te iwi.

Born & Sonzogni (1995) identify the ‘what is’ of IEM as having the following characteristics:

- a). Comprehensive/inclusive
- b). Interconnective
- c). Strategic.

Those characteristics are evident in the make-up of the Trust’s comprehensive and inclusive Trust Board and its interconnective working groups⁴. The Trust’s vision is strategic and overarching and is supported by a Non-Statutory Management Plan that sets out to achieve the vision.

PUTTING IEM INTO PRACTICE

The final characteristic of IEM from Born & Sonzogni (1995) is focused on making IEM happen. It can be described as ‘d) interactive/ coordinative’. It is about moving IEM from the realms of professional jargon and political rhetoric into practice (Margerum & Born 1995), whilst being a necessary step to ensure the best strategic actions occur for the natural resource.

It is now the challenge for both councils and the Trust to ensure IEM is effectively implemented and achieved with regards to the Avon-Heathcote Estuary and its catchments. The Estuary is an integrated ecosystem that needs IEM (O’Connor 2001). It is an open-ended ecosystem, driven to high levels of productivity by nutrient enrichment (O’Connor 2002b). For the recovery of biodiversity, as well as for its better fulfilment of human wants in recreational and residential enjoyment, it probably requires reduction in nutrient load as part of its

IEM. Such a reduction is expected to lower productivity. How it affects biodiversity can only be conjectured unless serious biological and environmental monitoring is renewed before wastewater discharge to the Estuary is ended.

The edges of the IEM Estuary jigsaw puzzle have already begun to form, as the approach of IEM through the vision for the Estuary and its catchments is recognised, valued and supported by the community, CCC and ECan. In order to achieve IEM and complete the puzzle two extra pieces are required, the Trust and the Non-Statutory Management Plan. These two extra pieces will enable achievement of the IEM of the Estuary and its catchments. This process is illustrated through the two diagrams⁵ below (Fig. 2A,B).

Much is said in the literature of the barriers to IEM but to focus on the positive Cairns (1991, p. 17) has a number of suggestions to bridge the gap between recognising puzzle edge pieces and implementing IEM, which is when the puzzle is complete. The suggestions include:

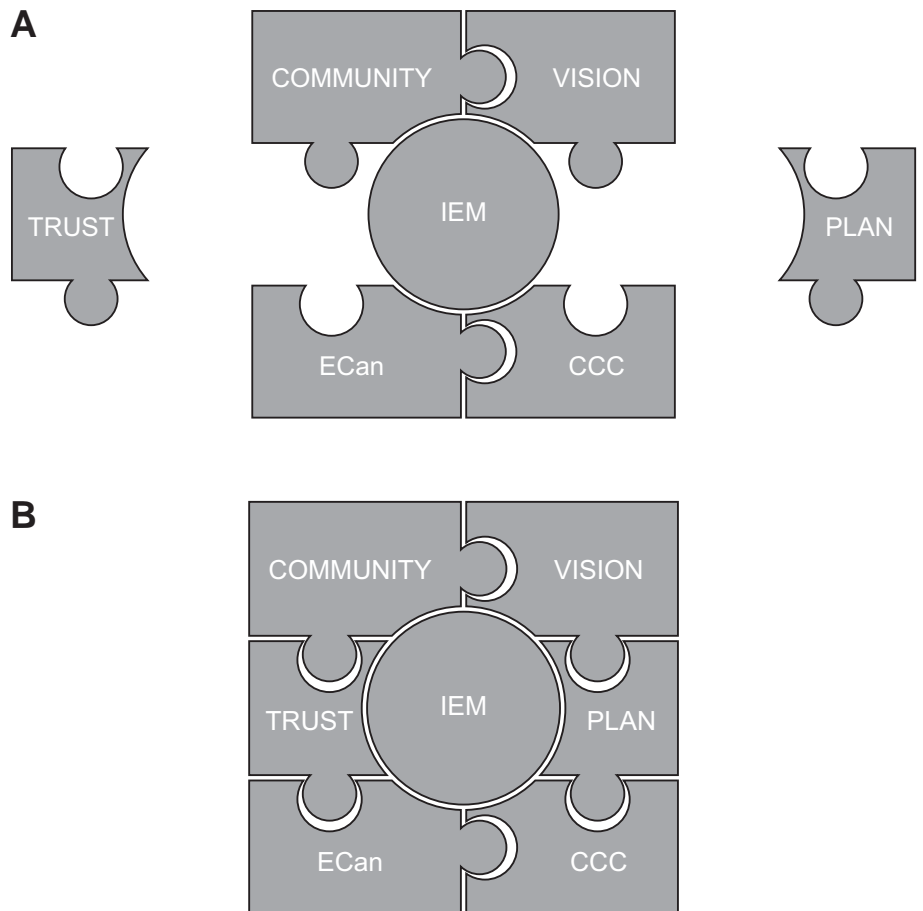
- Endorse IEM
- Support the move from fragmented incremental decision making
- Focus on ecosystem attributes rather than management by components
- Help identify important thresholds for estimating ecosystem assimilative capacity
- Encourage rehabilitation of damaged ecosystems — improve quantity and quality
- Encourage educational institutions and employers of graduates to facilitate and recognise the need for interdisciplinary activities including IEM
- Understand the community’s attitudes towards environmental management and support for IEM.

To aid in the implementation stage of IEM or as previously mentioned as ‘step d) interactive/ coordinative’, Margerum & Born (1993, 1995) have identified with Arnstein’s (1969) model,

⁴ The Trust currently has three working groups — Education and Publicity, Research and Monitoring, and Non-Statutory Management Planning.

⁵ Although the illustration of the puzzle does not include other stakeholders, the Plan does.

Fig. 2 IEM puzzle for the Estuary. **A**, incomplete; **B**, complete.



the citizen participation ladder. They view stakeholder involvement and contribution throughout the IEM process as a key to the success of IEM. Decisions resulting from an IEM process come from a representative group and therefore, shared decision making should generate all round support for those decisions. In line with these findings is Cairns (1991) belief that teamwork is the essence of integrated resource management.

The mechanism chosen by the community through the Trust and supported by Christchurch City Council and Environment Canterbury to recognise, implement and ultimately achieve IEM is a Non-Statutory Management Plan for the Estuary and its catchments⁶, a plan currently being developed into which component current actions are being fitted.

NON-STATUTORY MANAGEMENT PLAN

The Plan's goals are overarching and are

taken directly from the Trust's vision for the Estuary and its catchments. Beneath each goal is a series of interconnective targets. Meeting those targets will mean achievement of that particular goal. Under each target is a list of strategic actions with assigned responsibility and a progress indicator that recognises the achievement of that action as it relates to the ultimate achievement of the target. IEM is an integral part and action of this Plan. It is not a single action that can be assigned to a single goal; instead it is relevant to all of the Plan's goals.

Two examples of biodiversity actions in the context of the Plan are described below:

- **Action 42** — Implement a restoration and protection plan for native ecological communities (plants) through students under guidance from the Research and Monitoring Working Group

⁶ An inclusive group is developing this Plan; members of the Trust with assistance from Christchurch City Council and Environment Canterbury.

- **Action 44** — Support continuation of enhancement programmes — a planting group established and two planting sessions to be carried out by 2004 in conjunction with CCC.

The Trust’s Business Plan diagram could itself be considered somewhat reflective of IEM. It illustrates the integration of the Trust’s activities, documents and people in order to achieve the vision that the Trust holds for the Estuary and its catchments, the puzzle we are all trying to complete. Without a picture to illustrate how the completed puzzle will look the Trust’s Business Plan diagram provides a guide on how to complete the puzzle.

This vision is at the top of the triangle; beneath it are the six objects of the Trust followed by strategic and tactical goals (Fig. 3). Underlying the above are the documents that enable the Trust to function in a coherent, strategic, holistic and integrated way. Supporting all of the above is the people power, the working groups of the Trust with CCC, ECan and stakeholders that have been and will be responsible for achieving the layers of the triangle that sit above them, and ultimately attaining the vision.

CONCLUSION

Discussion of appropriate means of achieving effective management of the estuary has been ongoing for many years. While there appears

to be unanimous agreement among interested parties that the estuary is a valued ecosystem, for a plethora of reasons, the reality of balancing conflicting values and resource use has largely eluded the community to date.

The formation of a partnership in the Avon-Heathcote Estuary / Ihutai Trust and the adoption and enactment of IEM through a community-based non-statutory management plan represents an opportunity to move forward and increase the net benefits of the area including some recovery of indigenous biodiversity.

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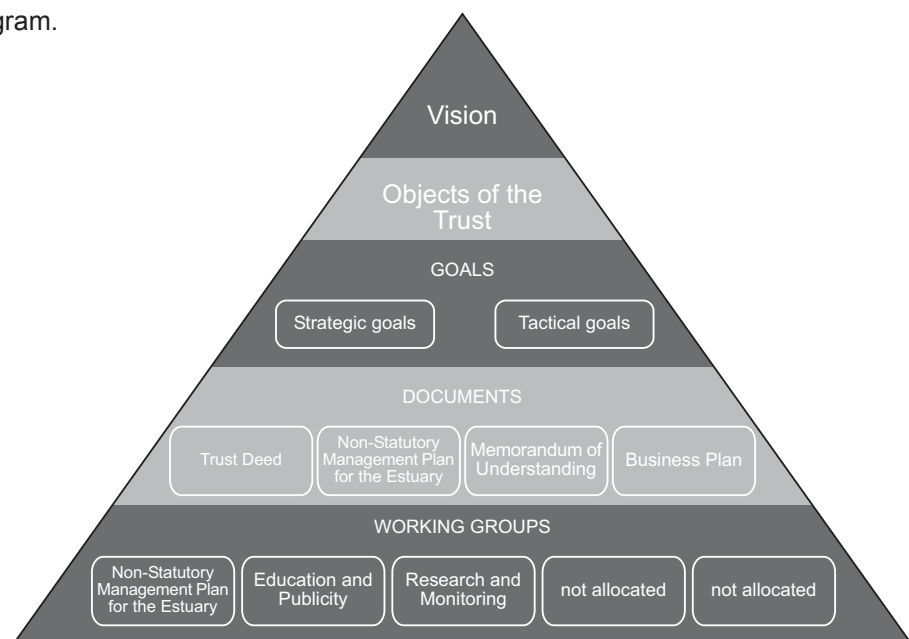
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Fig. 3 Trust Business Plan Diagram.



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