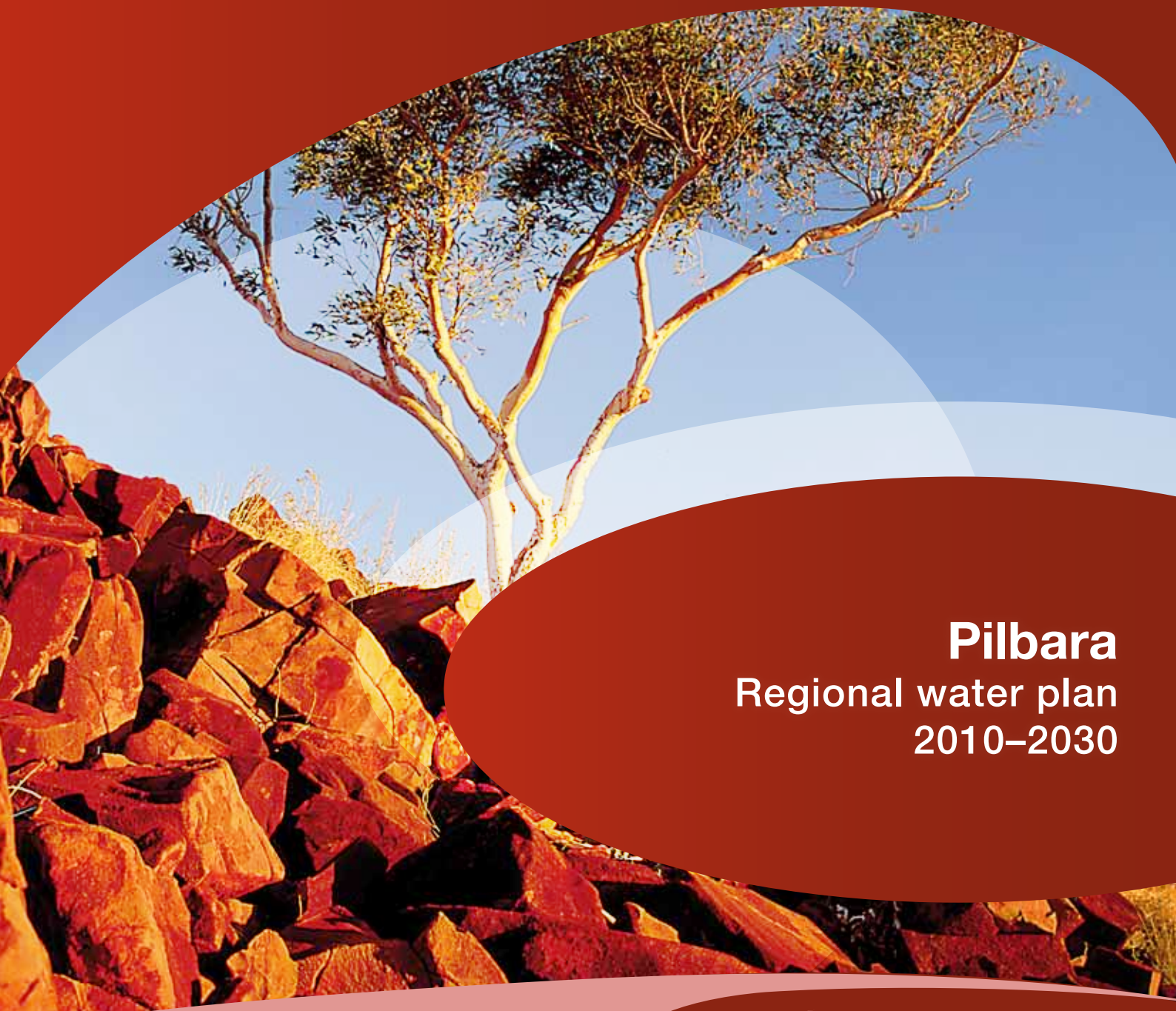
Government of **Western Australia**
Department of **Water**



Pilbara
Regional water plan 2010–2030

Looking after all our water needs

June 2010

Pilbara
Regional water plan 2010–2030

Looking after all our water needs

Department of Water
May 2010

Department of Water
168 St Georges Terrace
Perth Western Australia 6000
Telephone+61 8 6364 7600
Facsimile +61 8 6364 7601
www.water.wa.gov.au

May 2010

ISBN 978-1-921468-70-4 (print)
ISBN 978-1-921468-71-1 (online)

Recommended reference citation is: Department of Water 2010, *Pilbara regional water plan 2010–2030*, Department of Water, Perth, Western Australia

Plan documents

A complete set of the Pilbara regional water plan documents listed can be found at www.water.wa.gov.au/pilbara

- *Pilbara regional water plan 2010–2030 (this document)*
- *Pilbara regional water plan 2010–2030: Supporting detail*
- *Pilbara regional water plan 2010-2030: Statement of response*

Background documents

- *'We used to get our water free': Identification and protection of the Aboriginal cultural values of the Pilbara region*
- *Prospective demand for water in the West Pilbara*
- *The Pilbara coast water study*

Acknowledgements

The Department of Water would like to thank the following people for their contribution to this plan: Fiona Lynn, Darryl Abbott, Dianne Abbott, Tina Said, Louise Lee and members of the Pilbara project team. The department would also like to thank the members of the Pilbara consultative committee and the regional office in Karratha.

Disclaimer

Minister's foreword

Next to the unique landscape and rich biodiversity, water is a defining feature of Western Australia's Pilbara region. Aboriginal people have long recognised this in their survival and sustainability.

Water availability for future development in the Pilbara, is problematic and highly dependent on the climatic conditions dominated by tropical cyclones which occur predominantly from January to March. Severe droughts can be followed by major floods. The number of cyclones and the amount of water they bring changes from year to year, making water a highly variable resource.

With European settlement and the building of towns and ports supporting the growth of the mining, pastoral and tourism industries, water remains a vital ingredient for the Pilbara's future. As with other regions in Western Australia, the Pilbara has a number of challenges to overcome in meeting its current and future water needs. Increasing population and industry demands, and indeed making the region an attractive place to live and work, are challenged by the unreliable rainfall, and hence water availability, and the uncertainty in the future climate. The key drivers to viable regional development are people, energy and water. We must be well-placed so that water does not become the growth rate limiter in the development of a revitalised Pilbara region. A clear, dynamic vision and careful planning can help the mining industry and regional community to adapt to the challenges.

This *Pilbara regional water plan* provides a new strategic and longer term approach to sustainable water resource planning and management for the Pilbara. It reflects our current understanding of the region's water resources and presents a strategic overview of the major challenges facing the region today and will most likely face the region in the future.

To meet these challenges, a vision for the region's water future to 2030 has been developed with an action plan over a five-year time frame.

This plan will help to guide the Pilbara's water future to 2030 and ensure water security and outcomes for the current and future needs of all water users in the Pilbara.

I thank the community and members of the Pilbara consultative committee for their efforts in providing assistance to the Department of Water in the preparation of this Plan and encourage all who have an interest in the water resources of the Pilbara region to become actively involved in working together to achieve the objectives of this Plan.

Dr Graham Jacobs MLA
Minister for Water; Mental Health

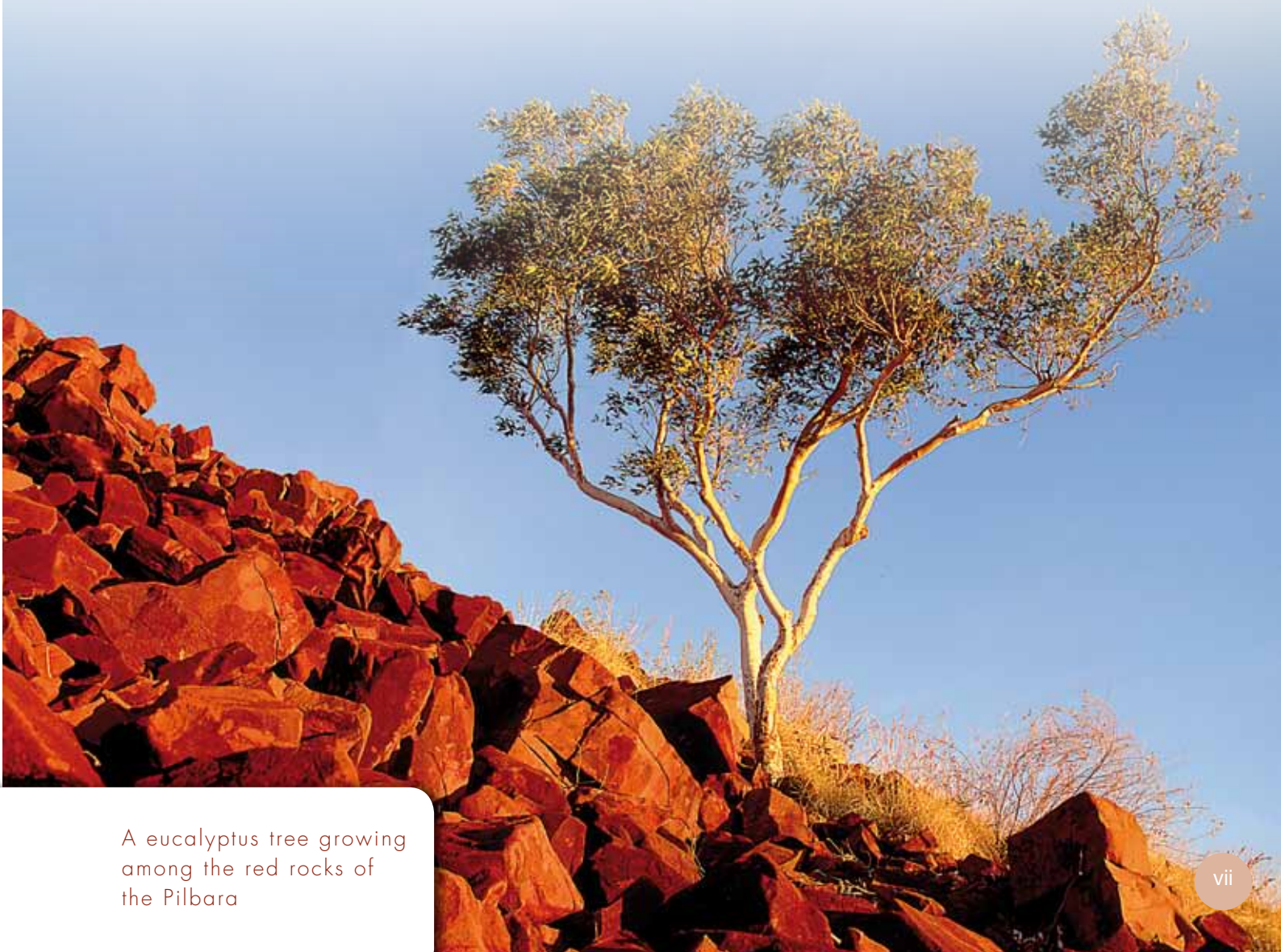
Contents

Aboriginal recognition

Aboriginal people have lived in the Pilbara's arid and variable environment for thousands of years: their way of life and system of beliefs are intimately linked to water, on which their survival traditionally depended. Aboriginal people continue to have a strong connection to water. Their beliefs require the traditional owners to regularly perform rituals and to conduct law business at water sources located in their country.

Access to water sources is important not only to exercise custodial responsibilities but also for gathering bush tucker. Water sources of various types also act as boundaries to the countries of different language or tribal groups. Since European settlement in the Pilbara, Aboriginal people have increasingly experienced problems using water sources in culturally traditional and appropriate ways.

The Department of Water is committed to working with Aboriginal people in its planning and management activities. The department recognises that Native Title provides an important framework for water management. Native Title is the recognition in Australian law that some Aboriginal people continue to hold Native Title rights to lands and water arising from their traditional laws and customs. A significant proportion of the Pilbara is subject to Native Title or Native Title claims.



A eucalyptus tree growing among the red rocks of the Pilbara

Millstream-Chichester
National Park.

Introduction

Water is a defining feature of the Pilbara. Management of water is vital for the towns and ports, tourism, the pastoral industry and the mining industry, which dominates economic activity. Water is also vital to the Pilbara's environment, with its unique and rich biodiversity.

The Pilbara region's mineral and petroleum sectors are major drivers of the state's and Australia's economy and an unprecedented increase in mining, particularly of iron ore, has occurred in recent years. Over the next 10 years, iron ore production in the Pilbara is expected to double.

This growth in mining has seen more water being abstracted at mine sites and increased demand on the water supply schemes that serve the towns and ports. Water availability in the Pilbara, however, is problematic. Severe droughts can be followed by major floods. Rainfall is generally reliant on cyclones and their number and amount of water they bring varies from year to year. Recent work by the CSIRO suggest that water availability from the region's surface water and groundwater sources is likely to become more variable in the future due to a drying climate trend.

With its growing water demand and variable water supply, the Pilbara was identified as a priority in the *State water plan 2007* for the development of a regional water plan. Regional water plans guide water resource management over the long term (to the year 2030) across the state. The Department of Water is responsible for completing the regional water plans and they will be implemented through government, industry and community partnerships.

The *Pilbara regional water plan* is part of a series of nested planning activities of the Department of Water. These are outlined in Figure 1.

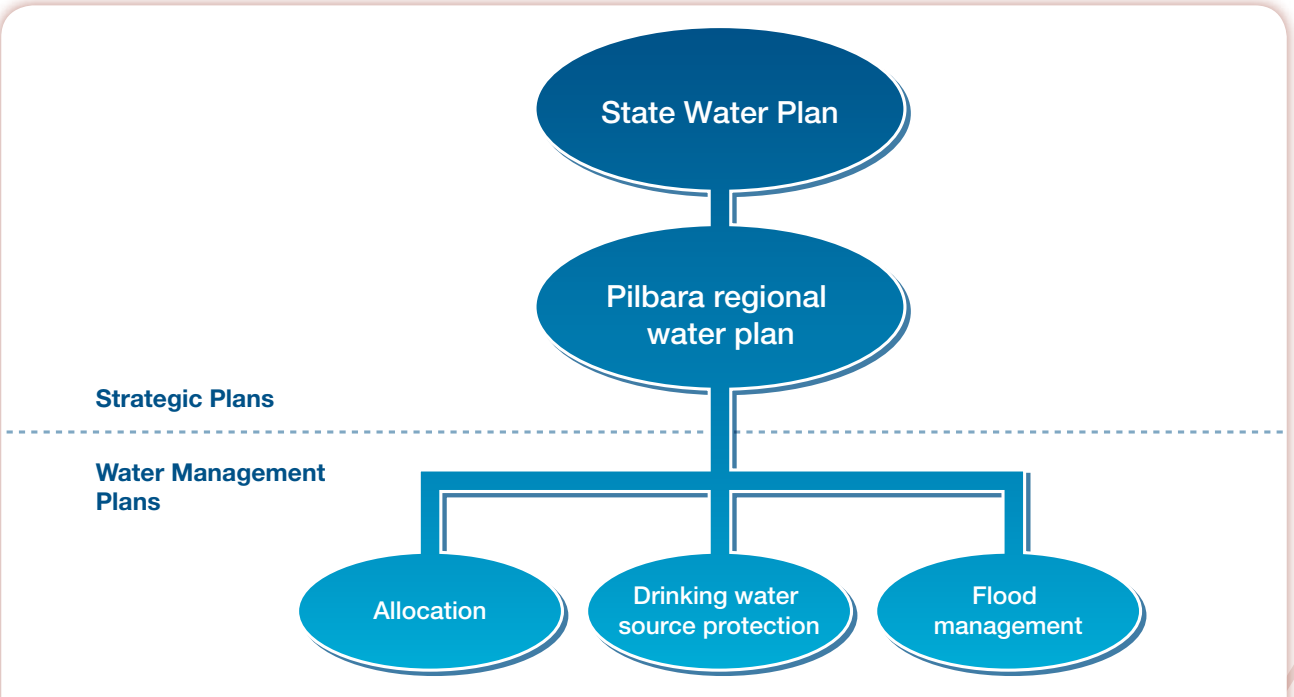


Figure 1
Pilbara water planning framework

The plan's consultation process

Consultation has been crucial to the development of this regional water plan and will be essential for its implementation. The Department of Water organised an open forum and other discussions with interested and affected parties and established a consultative committee for the plan.

The Pilbara consultative committee was involved in identifying the strategic water issues faced by the Pilbara as well as setting the vision and recommended actions in the plan to respond to these issues.

The department recognises that engagement with Aboriginal people in the Pilbara needs to go beyond open forums and committees. Thus far, it considers its formal engagement with Aboriginal people to be preliminary. The department will work with the region's traditional owners to ensure a long-term engagement process which best suits Aboriginal people.

Pilbara regional water plan

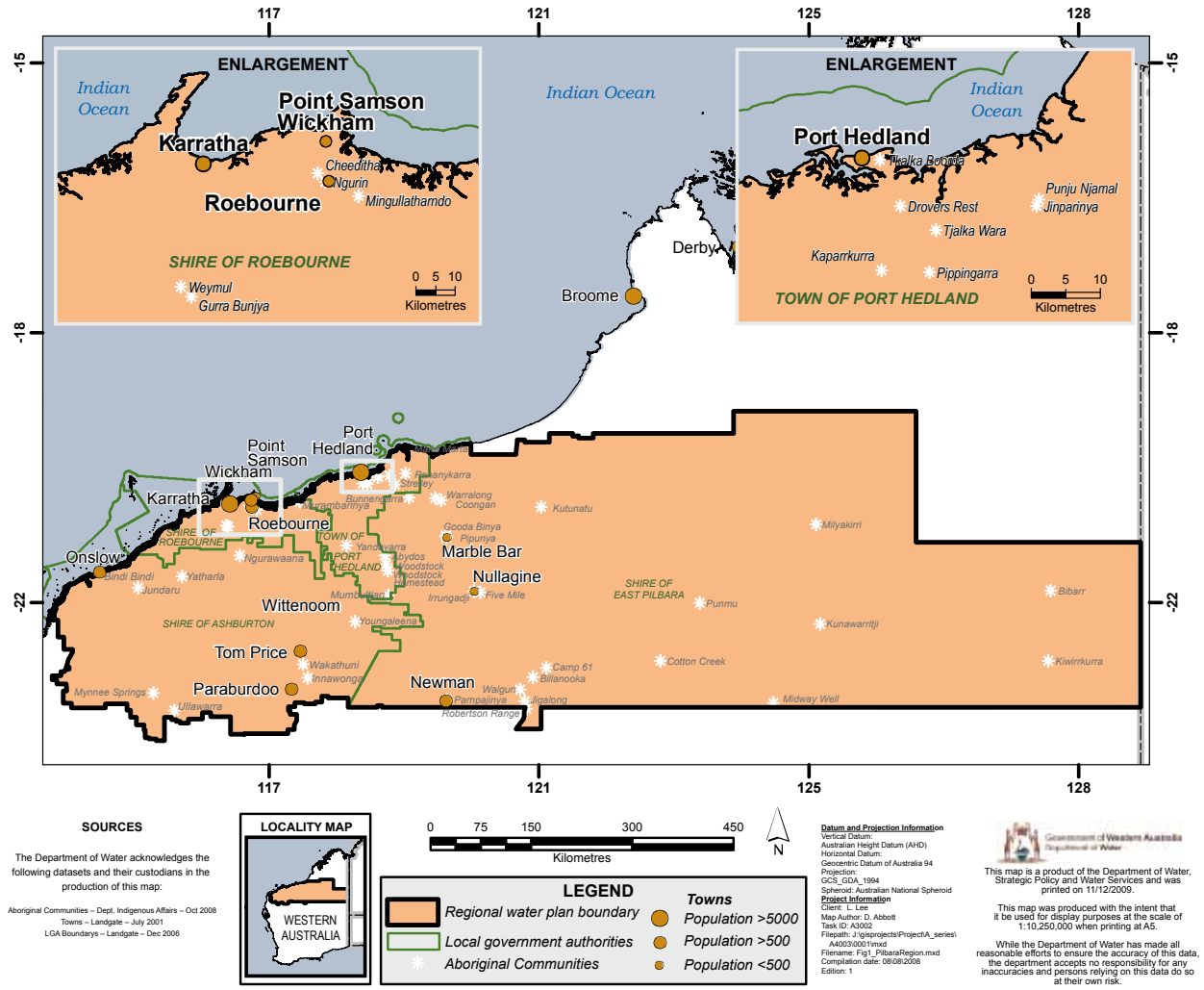


Figure 2
Pilbara regional water plan area

Plan area

The Pilbara is a large, sparsely populated region bounded by the Indian Ocean to the west and the Northern Territory border to the east, covering more than 500 000 km², as shown in Figure 2.

Regional water plans are being developed throughout Western Australia, the boundaries for which generally align with the Regional Development Commission boundaries set out by the Department of Regional Development and Lands. This plan covers all water users within the plan area, although different aspects of the plan will be relevant for different water users.

The plan's purpose

Given the growing demand for a highly variable water resource, the purpose of this plan is to set the strategic directions for the management and development of the Pilbara region's water resources in a sustainable manner to maintain and enhance its natural environment, cultural and spiritual values, quality of life and economic development. The plan has a long-term view to 2030 and identifies priority actions for implementation over the next five years.

Managing the region's water

Established in 2005, the Department of Water is responsible for water policy and planning and the overall management and regulation of water resources in Western Australia.

The Department of Water is accountable for investigating and assessing water resources, providing security of water use for the community and environment, licensing water use, protecting the quality of drinking water, planning for drainage and floodplains, setting standards for water service provision and implementing water reform.

The department is committed to working with other organisations with water-related priorities in the Pilbara. This includes other government agencies, natural resource management and industry bodies, traditional owners and non-government organisations.

The Pilbara is a unique and diverse ecosystem. The rapid economic development likely over the next 20 years has the potential to impact on that unique and diverse ecosystem. Effective management of the water-dependent values of the Pilbara (that is, waterways, aquifers, wetlands, springs, floodplains and estuaries) – while still meeting economic development needs – is a key challenge for the future.

Water reform

Water reform processes, at both the state and national levels, are introducing significant changes to how Western Australia manages and plans its water resources, which in turn will influence long-term water resource planning and management in the Pilbara.

In 2006, Western Australia signed the Intergovernmental Agreement on a National Water Initiative (NWI). This is an agreement between the Australian and state and territory governments that recognises the imperative to increase the productivity and efficiency of Australia's water use and protect the health of surface water and groundwater systems. The mining industry is a significant user and manager of water in the Pilbara and the NWI recognises that water management in the mining industry may differ from other industries.

The differences stem from the relatively short timeframes in mining operations, the potential to make use of water that is unusable in other industries and the industry's high level of regulation through the mining approval process.

Western Australia has set a reform agenda consistent with the NWI, which includes water allocation plans for high priority areas and new legislation for water resource management and water service provision.

Water allocation plans define limits on the abstraction of water from any water resource being managed under the plan. They specify where and how water entitlements will coexist within the plan area. Water allocation plans also establish the impact management arrangements required to manage abstraction, which will apply irrespective of the type of water entitlement issued (Government of Western Australia 2007).

In the Pilbara, water allocation plans will be developed for all areas where there are likely to be multiple interests (such as mining, towns and ports) seeking to use and/or abstract water from the same resource. Coastal alluvial aquifers will be the first priority areas. There are currently no water allocation plans for the Pilbara.

Water licensing for stock and domestic use is not required under the *Rights in Water and Irrigation Act 1914* (WA) unless water is from an artesian source. This will continue to be the case under the water reform agenda.

The Fortescue River in flood after a cyclone

The present

Where our water comes from

Streamflows in the Pilbara are highly seasonal and variable. Most runoff or recharge occurs as a result of episodic cyclonic activities. Other rainfall comes from local thunderstorms and the northern edge of frontal systems that bring winter rains to the south-west of the state. The number of cyclones and the amount of water they bring changes from year to year, making water a highly variable resource. All watercourses are ephemeral and stop flowing for at least part of each year. As such, surface water (water in rivers and pools) is usually not used as a permanent water supply. One surface water source that is used as a major water supply is the Harding Dam. Due to evaporation losses and high levels of sediment, Harding Dam is able to supply water at current levels of demand for approximately two years (without a large recharge event).

Because of the variability in rainfall and high evaporation losses from storing water in dams, groundwater is a very important water resource in the Pilbara. Groundwater originates from direct infiltration by rainfall and from surface water flows. Groundwater occurs throughout the region but is most easily located and accessed near surface water drainage lines (alluvial channels).

The quantity, quality and reliability of the groundwater held in the different aquifer types varies, as does the impacts of abstraction from the aquifers. The aquifers on the Pilbara's coast are relatively small, typically receiving an annual recharge of less than 10 GL/yr. Yet a number of these aquifers are significant because they are the only water sources for the coastal towns and ports. The also play an important role during periods of low or no recharge, in sustaining permanent pools – which in turn support ecosystems in an otherwise arid environment.

Only a proportion of the potential yield from an aquifer is available for consumption, as water is also needed to support environmental, social and cultural values. Yields also vary from year to year depending on rainfall.

Away from the coast, in the central and eastern Pilbara, most of the aquifers are in zones of fractured rock. These fractured rock aquifers are harder to locate than the coastal aquifers and the amount of water available from them is difficult to predict. Water supplies in inland areas, therefore, can be problematic both in quantity and quality.

Fractured rock aquifers can also be overlain by other aquifer types – further complicating how the aquifers are recharged and how they respond to abstraction. The water abstracted from these aquifers is mainly for mine use and mine dewatering purposes. The amount of water abstracted may range from less than 1 GL/yr to 10–40 GL/yr.

A gorge at Karijini National Park

Existing water use

Water use across the Pilbara is dominated by mining operations and mine dewatering discharge, which respectively account for an estimated 26 per cent and 52 per cent of total water use (Figure 3). Total water use in 2008 was estimated at 127 GL/yr.

Most of the water used by towns and port facilities, in terms of volume, is delivered through the West Pilbara and Port Hedland water supply schemes. The West Pilbara water supply scheme supplies the towns and port facilities of Karratha, Dampier, Roebourne, Wickham, Point Sampson and Cape Lambert.

Water for the scheme comes primarily from the Harding Dam with the Millstream borefield being used when water is not available from the dam. The water quality can vary between these two sources and some residents notice the change from one resource to the other. The water quality from both sources meets the *Australian drinking water guidelines* (NHMRC 2004).

Recharge of the Harding Dam and Millstream borefield occurs predominantly through cyclonic events, typically the same cyclone. The Port Hedland water supply scheme services Nelson Point, Finucane Island, Port Hedland and South Hedland. The scheme draws water from borefields in the alluvial aquifers within the Yule and De Grey rivers. Borefields on the Yule and De Grey are also recharged by cyclones but typically these are different cyclones given the locations of the two borefields.

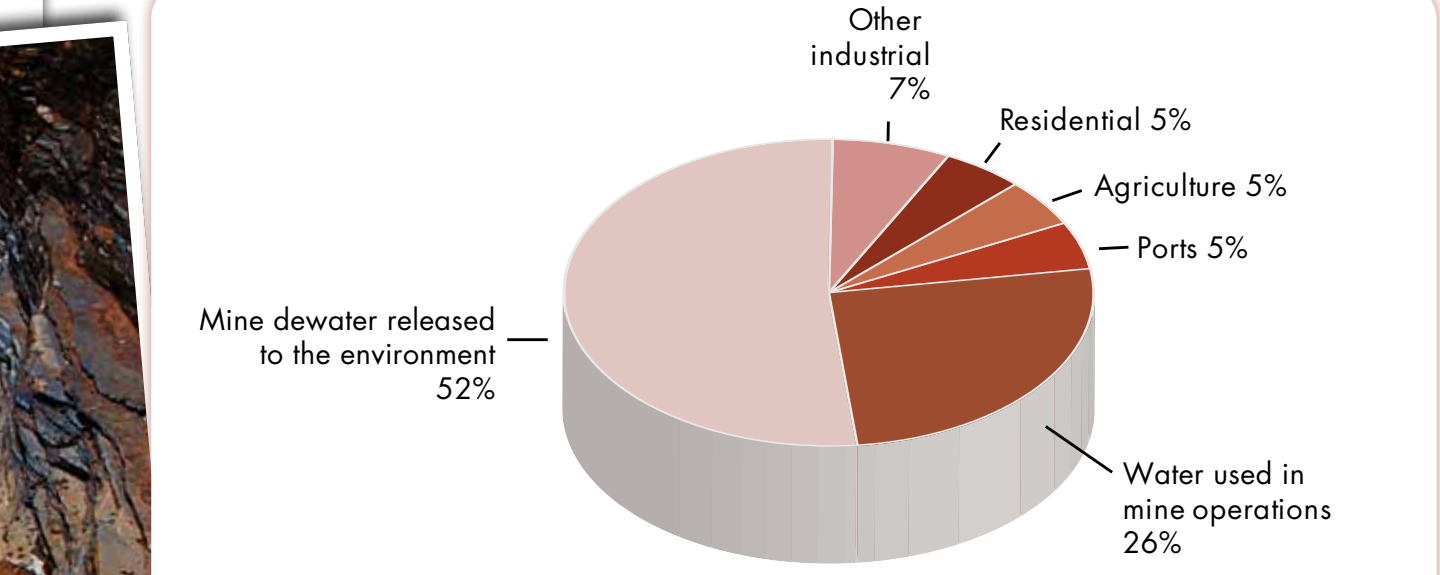


Figure 3
Pilbara water use by sector 2008
Source: Economics Consulting Service (2008)

Water for the other main towns – Onslow, Newman, Tom Price, Paraburdoo, Marble Bar and Nullagine – comes from a variety of groundwater sources near the towns.

Drinking water source protection plans exist for all Water Corporation-supplied towns except Marble Bar and Millstream water reserves. Plans for these sources are due for completion in 2010.

Water services to a number of remote Aboriginal communities are provided through the Department of Housing's Remote Area Essential Services Program (RAESP). In cooperation with the Department of Water, service providers are developing water source protection plans for a number of these communities. Further, the department is currently working through a process to improve water source licensing for Aboriginal communities, under the *Water Services Licensing Act 1995* (WA), Hamersley Iron Pty Ltd is the licensed service provider for Dampier town (within the West Pilbara scheme) and for Tom Price and Paraburdoo. The Water Corporation is the licensed service provider for the remainder of the West Pilbara and for Port Hedland, Onslow, Newman, Marble Bar and Nullagine. The service standards and reporting requirements for providers of potable water are similar for both licensed providers in the Pilbara.

Water for fly-in/fly-out camps and remote Aboriginal communities also comes primarily from groundwater sources. Camps and communities are not currently licensed under the *Water Services Licensing Act 1995*, as they are not in a controlled area under the Act.

However, under new water service legislation to be introduced to the Parliament of Western Australia in 2010, the whole state will become a controlled area. The new Bill will require all defined water service providers, including those in remote areas, to be either licensed or formally exempted from licensing requirements.

A blanket exemption of Aboriginal communities is not envisaged, and would not be consistent with the principles of improving living conditions and socio-economic outcomes for Aboriginal people outlined by the Government of Western Australia (Department of Indigenous Affairs 2009). The government is currently identifying infrastructure requirements and priorities for remote communities, which will include water infrastructure.

Most of the water used in mining operations or discharged due to dewatering of mines occurs away from the Pilbara coast. A high proportion of iron ore and other mineral resources is located below the watertable, requiring groundwater to be removed (dewatered) in order to mine safely. The amount of water removed tends to vary over the life of the mine, with larger volumes being dewatered in the early part of the mine's life.

The taking of water for dewatering purposes is managed under the *Rights in Water and Irrigation Act 1914* (WA) to minimise the adverse impacts of the abstraction and release of water. The discharge of mine dewater is also managed under the *Environmental Protection Act 1986* (WA) to ensure that appropriate measures are taken to prevent degradation of any receiving waterbody. Most mining in the Pilbara is open-cut mining and can result in large mine voids at the end of a mine's life. If these voids extend below the watertable, artificial pit lakes will be created. These lakes require careful management to avoid water quality problems.

Water is also used in the pastoral industry where groundwater supplies and surface water features (pools and springs) are used for watering livestock. In volume terms, the pastoral industry is a minor water user but the industry's role in managing water and water courses is an important one.

Water and the environment

Water is used not only for consumptive purposes but also to support environmental, social and cultural values.

The Pilbara is one of the World Wildlife Fund's Global 200 Eco-regions, selected for its unique and rich biodiversity. Water is a defining feature of the landscape and is therefore integral to the high-value environmental assets of the region. There are two Ramsar wetlands: Eighty Mile Beach coastal wetlands and Mandora Salt Marsh; and two proposed Ramsar wetlands: Millstream Pools and Fortescue Marsh. Wetlands of national importance can also be found in the region, as well as a number of wild rivers and water-dependent threatened ecological communities.

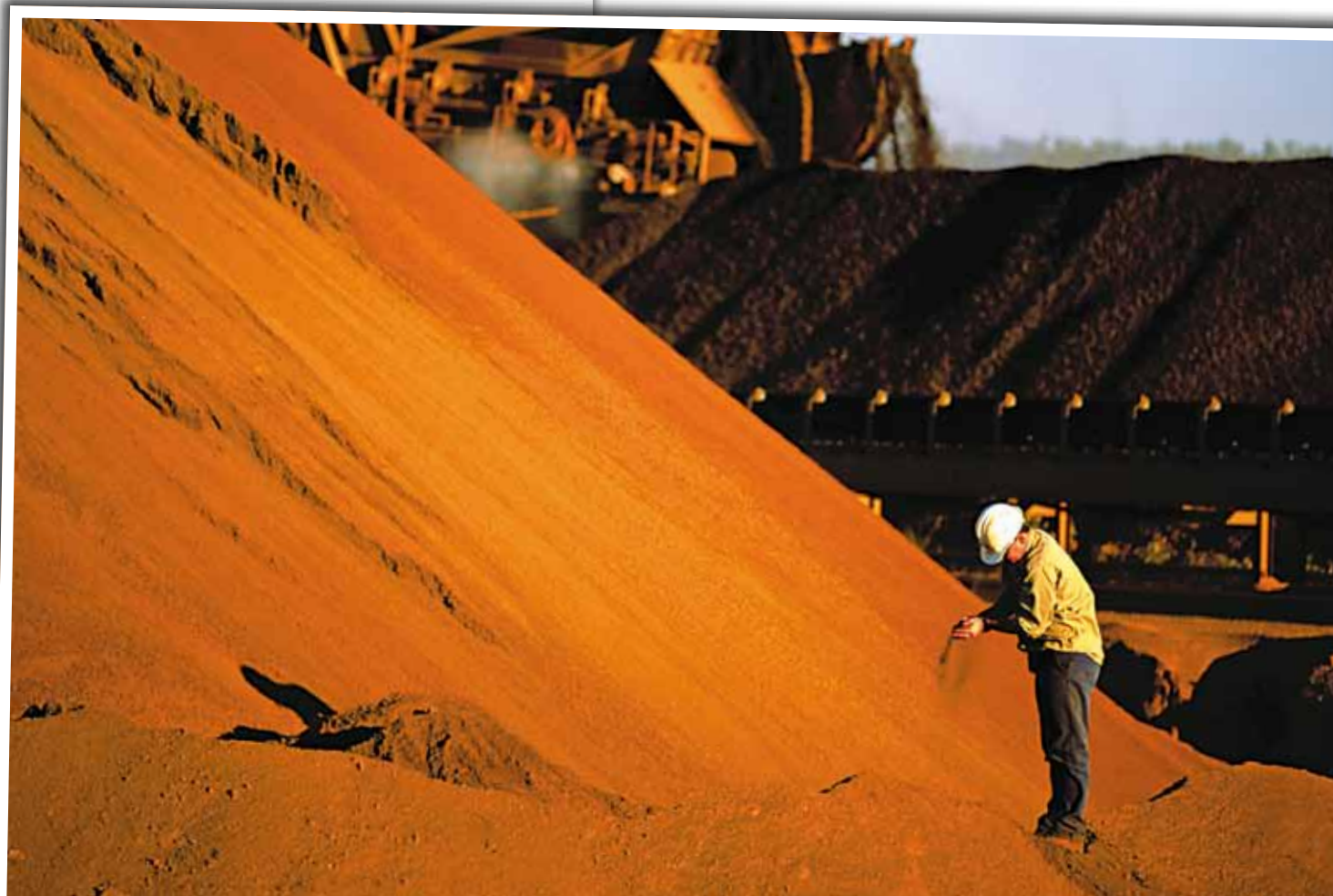
Water is vital to sustaining pool ecosystems, riparian and groundwater-dependent vegetation, as well as groundwater habitats.

Water is also important to maintain social amenity. The rivers, springs and wetlands, particularly those close to population centres, are an important part of the outdoor lifestyle attraction. Maintaining green spaces, sporting fields and attractive gardens is also significant to the aesthetic quality of the Pilbara's towns.

Much of the region's tourist activity is also related to water; for example, people are attracted to the gorges, waterfalls and pools of the Karijini National Park and the Millstream-Chichester National Park.

The Aboriginal people of the Pilbara continue to have a strong cultural connection to water and retain important custodial links with the region's water resources.

A mine site in the Pilbara



Future trends

Growth in water demand

The predominant land uses in the Pilbara are mining and pastoral: in economic terms mining is the dominant activity. A recent study on water demand in the Pilbara estimates that iron-ore production will double between 2007 and 2013. Growth is likely to continue after this but may be at a slower rate (Figure 4). If growth in this industry is to be supported, along with other water users in the Pilbara, a secure water supply and certainty in water planning and management is required well into the future.

The most immediate consequence of economic growth has been increased demand for water in the coastal towns. The demand for water now exceeds the long-term reliable water supply for the West Pilbara scheme. An additional supply source is needed for the West Pilbara scheme by 2012 and the Water Corporation has began the identification and planning for its next water sources.

The demand for water is approaching the long-term reliable water supply for the Port Hedland scheme and an additional source will probably be required before 2015. As with the West Pilbara scheme, next-source planning has also begun.

Water demand for Onslow is also approaching long-term reliable supply and an increase in supply will be required, if growth in industrial demand is to be met.

On currently available information, the inland towns of the Pilbara have sufficient water to meet their future needs. In some Aboriginal communities, however, quality problems can affect water supplies.

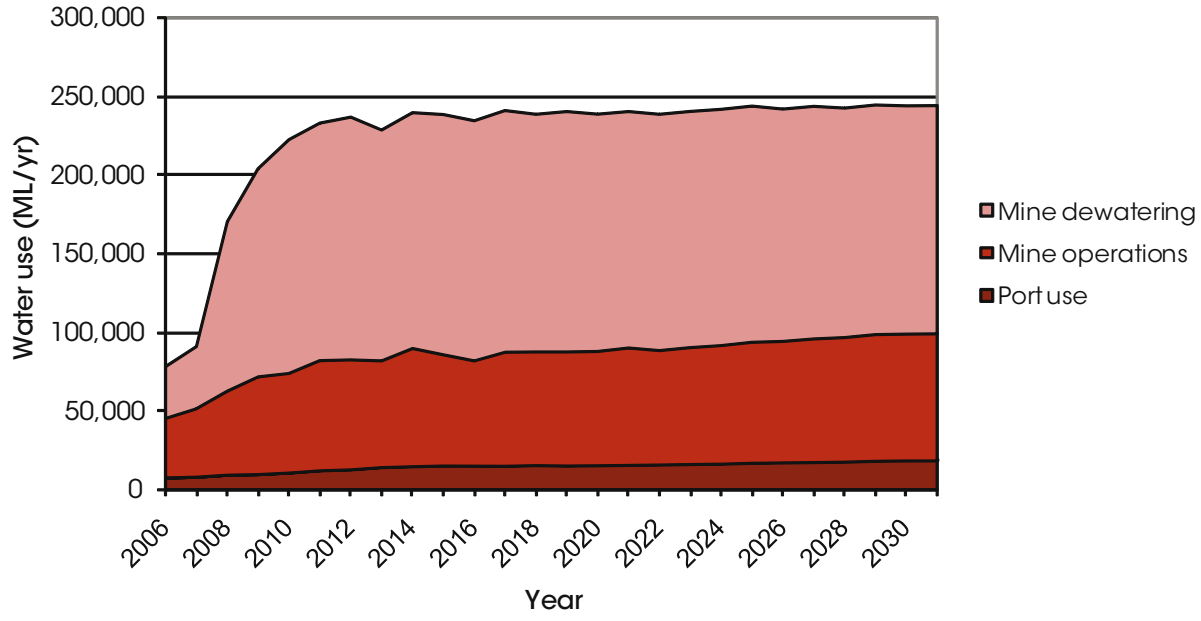


Figure 4
Mining water projections in the Pilbara
Source: Economics Consulting Services (2008)

Challenges to overcome

The significant growth of mining in recent years, particularly of iron-ore, has seen more water being extracted at mine sites and increased demand for water at the towns and ports.

The expansion in mining operations will mean a need to manage increasing amounts of dewater as well as wastewater from on-site processing; and managing mine voids and the quality of water in those voids at the end of the mine's life. With a greater number of multiple activities in a catchment or subcatchment, there will be a greater emphasis on managing for cumulative impacts. The mining industry has shown a willingness to adopt best-practice approaches to water management and acknowledges its important role in the stewardship of water resources.

To meet the increased demand for water at the towns and ports, a number of potential water source options exist. These range from surface water from dams and groundwater sources along the coast and inland, to desalination and other non-traditional sources such as dewatering from mines and recovery from slurry pipelines. The advantages and disadvantages of these sources for use in public water supply or self-supply are outlined in the table below.

Table 1
Characteristics of potential water sources

Type of source	Advantages	Disadvantages
Surface water – dams	Good quality provided turbidity is low	Relies on rainfall Lack of appropriate sites High evaporative losses Turbidity problems Long-lead times for environmental approval and land acquisition
Groundwater	Low evaporative losses More reliable supply	Relies on rainfall/recharge Costly to abstract and transfer Environmental impacts if groundwater levels fall Potential cumulative impacts where multiple users are drawing from the same groundwater source Water quality varies
Seawater Desalination	Does not rely on rainfall Volumes produced can be increased with the addition of extra capacity Becoming more cost effective as technologies improve	Difficulty in finding appropriate sites Discharge of brine needs to be managed High cost capital and high energy use
Third-party supply (dewatering, slurry pipeline recovery etc.)	Can minimise environmental impacts Can match lower quality water with industrial requirements	Long-term access is dependent on primary user Water is costly to transport so distance between water source and water demand will be critical to feasibility

Given the unreliability of rainfall dependent groundwater and surface water sources in the Pilbara, non-traditional sources – such as desalination and third-party supplies (use of mine dewater and water recovery from slurry pipelines) – are likely to play a greater role in future sources for town and port uses. The practicality of third-party supplies will be determined by supply security and the distance over which water has to be transported. Transporting water is expensive and there will also be environmental, cultural and social issues to be considered.

While finding new water sources is important to secure the Pilbara's water future, improving water-use efficiency is also vital. This regional plan sets a long-term aspirational target of improving water-use efficiency by 20 per cent. Such a long-term target is achievable for the Pilbara through changes in how and where ore is handled. Mining companies and the Water Corporation are already actively pursuing efficiency measures.

Though a smaller water user than industry, residential consumption is still a sizeable portion of overall water consumption in the Pilbara. A high proportion of indoor water use is already recycled, therefore the focus for water-use efficiency in the residential sector is on outdoor water use. For inland towns and mines with more water than they require, the focus will be on optimising water use to minimise environmental impacts.

Pastoralists have also been active in adopting best-practice water use. Examples include replacing windmills with solar pumps that allow for pumps to be shut off when tanks are full.

A drying climate and impacts on water availability

Meeting water demand is already complicated by a natural environment with highly variable rainfall. Recent work by CSIRO suggests that the region's surface water and groundwater sources are likely to become more variable and uncertain in the future due to climate variation with more frequent and severe droughts likely. Other CSIRO work shows a significant long-term decrease in tropical cyclone numbers for the Australian region, especially off the coast of Western Australia.

Because it affects both water supply and demand, climate variation will have implications across the Pilbara community and environment. If cyclones become less frequent, the availability of water from cyclone-dependent water supplies will decrease. Higher temperatures will increase the water needed for human use and the region's flora and fauna. Higher evaporation will reduce water availability in dams and pools, which may also impact on water quality. The likelihood of more extreme cyclonic events will also have implications for flood management and forecasting.

Windmill in the Pilbara

The vision

Pilbara water future 2030 vision:

The shared vision for water in the Pilbara region is that: 'Our precious water resources are managed and developed in a sustainable manner to maintain and enhance our natural environment, our cultural and spiritual values, our quality of life and the economic development of the Pilbara'.

This vision is supported by objectives developed in conjunction with the *Pilbara regional water plan's* consultative committee, which includes representatives from government agencies, landholders, traditional owners and industry. To clarify these objectives, long-term outcomes have been identified for each one. Water management principles have also been developed to guide ongoing water planning and management in the region. These are listed in Chapter 2 of the *Pilbara regional water plan – Supporting detail* report.

Objective 1: Ensure security of water supply for the current and future needs of all water users.

To meet objective 1, the Department of Water will work with water service providers to ensure a sufficient quantity of water of suitable quality is available to towns and ports to meet their growing demands. Over the long term, the department will work with others to ensure the current reliance on coastal groundwater and surface water sources shifts to a more diverse range of management options for water supply and demand such as desalination and third-party supplies. Given uncertain water demand growth and the variable nature of supply from groundwater and surface water sources, the department and water service providers will need to be ready to bring on new sources relatively quickly in response to demand: this will require investment in advance to investigate and prepare these sources for development. Industry can support water service providers and the Department of Water by indicating their water requirements well in advance of when it will be required. Water source protection plans will be completed for all Water Corporation sources.

Water for some inland towns and all mine site is supplied by industry. To improve supply security for these users, the Department of Water will improve water allocation planning (which is addressed under Objective 2 of this plan).

Objective 2: Ensure water use is balanced to meet environmental, social, cultural and economic values.

To meet objective 2, the focus will be to establish clear and transparent rules about how much water can be taken for consumption and how much must remain in situ or be returned to the environment to meet environmental, social and/or cultural objectives. Over the long term, water allocation plans will be established for all water resources where there may be multiple users interested in the same resources such as the alluvial aquifers. A priority action will be to establish water allocation plans in areas where current interest from multiple users is strong, namely the Cane, Yule, De Grey, Lower Fortescue, Robe and Turner coastal alluvial aquifers, the West Canning confined aquifer and the Millstream aquifer. The Department of Water will work with water service providers, industry, traditional owners, government agencies and other interested parties to develop its water allocation plans.

Some pastoralists in the Pilbara have expressed concerns about falling groundwater levels and increasing water salinity in recent years. This may be climate related or, at particular sites, may be a result of groundwater abstraction for mining. Both mining companies and pastoralists undertake groundwater monitoring, but currently this data is neither compiled nor readily accessible.

Over the next three years, the Department of Water will capture all hydrogeological data and bore-log information for the coastal aquifers and review the suitability of the current groundwater monitoring network. This will improve access to groundwater information, highlight areas where groundwater levels are changing and identify the next round of aquifers for which there is demand pressure.

Objective 3: Ensure that impacts, including cumulative impacts, are managed to protect the long-term health of waterways, aquifers, wetlands, springs, floodplains and estuaries.

The rapid development likely over the next 20 years has the potential to impact on the unique and diverse ecosystems of the Pilbara. To meet objective 3, the Department of Water will set management objectives in collaboration with other government agencies, landholders, traditional owners and industry. In setting these objectives, the Department of Water will be guided by the following broad principles:

- the healthy, natural and functioning state of high-value assets which remain in near pristine condition need to be maintained.
- the impacts of mining, pastoral, recreational and tourism activity on water-dependent values need to be minimised through best-practice water use
- ecological objectives and targets for water-dependent values that are likely to be affected by development, need to be set in advance, impacts monitored and management actions reviewed if necessary,
- ecological objectives and targets for the rehabilitation of water-dependent values at the end of the life of the development need to be set in advance.

The Department of Water's management objectives will be reflected in its water licensing and water allocation planning processes.

As a priority, the Department of Water will work with interested and affected parties to develop policies and guidelines for managing cumulative impacts. This includes government departments, particularly the Department of Environment and Conservation, as well as the mining and agricultural industries.

The department recognises there are many challenges to overcome before a robust policy on cumulative impacts can be successfully developed and implemented. These challenges include:

- developing a consistent approach to cumulative impacts across regulatory agencies
- developing a policy that will be aligned with regulatory processes, across all agencies
- aligning cumulative impact management with State Agreements
- addressing the consequences of cumulative impact management on water licensing processes.

Objective 4: Integrate land-use, infrastructure and natural resource management planning with water planning.

To meet objective 4, the focus will be to ensure that constraints on water availability, in particular the variability of supply from groundwater and surface water sources is recognised in all planning activities. In addition to these traditional sources, other non-traditional sources are to be considered including desalinisation, dewatering from mines and recovery from slurry pipelines.

As a priority, the Department of Water is working with the Department of Planning on a number of land-use planning activities in response to the rapid economic growth in the Pilbara. This includes the implementation of the Better Urban Water Management (BUWM, WAPC 2008) framework to facilitate better management and use of water resources by ensuring an appropriate level of consideration is given to the total water cycle at each stage of the planning process.

Maintaining key eco-hydrological processes will be a priority of the water allocation planning process. The department will also continue to work with the Department of Environment and Conservation, natural resource management groups and land managers to improve the link between water management and environmental needs. The Department of Water has completed floodplain mapping for the towns of Roebourne and Nullagine and a flood management strategy for Nullagine. The Pilbara's coastal areas can be affected by ocean flooding due to storm surge events and the Department of Planning is the lead agency for storm surge inundation mapping.

The Department of Water will also provide this regional plan to the Pilbara Regional Planning Committee (recently set up by the Western Australian Planning Commission) to ensure water is considered at the front end of any planning and management decisions.

Objective 5: Recognise and protect Aboriginal and other heritage values associated with water.

Aboriginal people are significant players in water resource management. To meet objective 5, the Department of Water will work with traditional owners and their representative organisations to develop long-term partnerships to support planning and the on-going management of water. As a priority, the department will focus on the areas where it is establishing water allocation plans.

Objective 6: Ensure the quantity and quality of water used is appropriate for the purpose for which the water is being used.

A long-term focus on water use efficiency in the Pilbara will be to required to meet objective 6.

The Department of Water will continue to work with water service providers, industry, local government and households to support improved water use efficiency. Given the high proportion of recycling of indoor water use, a strong focus for residential water use efficiency will be on outdoor water use. However, efficiency in indoor water use will continue to be important in the Pilbara, as it is throughout the state.

Objective 7: Support high-value use by industry and agriculture with the least adverse impact.

To meet the final objective of this regional water plan, it is essential that water management issues are planned for early in the mining development process and that all mining players adopt best-practice water use. Best-practice water use is also essential in agriculture, which may become a more significant water user if pastoral diversification occurs. As a priority, the Department of Water will develop best-practice guidelines for water use in mining.

With the expansion of mining and the consequent increase in the amount of water being abstracted in the Pilbara landscape, opportunities may arise to move water between mining operations or between mines and other water users. The quality and quantity of water potentially being discharged may vary greatly from the quality and quantity of water in local waterways and because of this, mine operators are required to ensure that appropriate measures are taken to minimise long-term pollution or degradation of any receiving waterbodies.

The Department of Water supports the movement of water as an option for further investigation, but recognises that even where there is the economic potential for moving water, significant social and cultural constraints may apply.

The provision of water for towns, ports, mines and other industries requires energy and, depending on the energy source, will contribute in varying degrees to greenhouse gas emissions. The Department of Water will work with water users to ensure that energy conservation and greenhouse gas reduction is a facet of all future water source development and water planning in the Pilbara.

Action plan

To manage water in the Pilbara effectively, the management objectives need to be clear, a good understanding of the region's environmental processes is required and management must occur at both the subcatchment and site scales.

The management objectives developed for this regional water plan will be reflected in the Department of Water's water licensing and water allocation planning processes. The management objectives are supported by a set of long-term outcomes. For each of the long-term outcomes, a number of immediate priority actions (for the period 2010–14) have been developed as follows.

Objective 1
Ensure security of water supply for the current and future needs of all water users.

Action number	Action	Agencies/organisations	Timing
Outcome 1.1 Risk-based water planning for coastal towns and ports			
1	Undertake annual water source assessments identifying both supply and demand risks for coastal towns and ports	Department of Water and water service providers	2010 Ongoing
2	Develop a Pilbara water source development strategy for Water Corporation's areas of operation	Water Corporation	2010
3	Review abstraction rules for all existing public water sources	Department of Water	2010–12
4	Identify and reserve potential public water sources	Department of Water	2011
5	Identify medium and long-term water resource options across the Pilbara	Department of Water, all water service providers and mining industry	2010–12
Outcome 1.2 Risk-based water planning for inland towns and Aboriginal communities			
6	Assess the quantity available and quality of water supplies for Aboriginal communities in the Pilbara	Department of Water, Department of Housing, other government agencies and Aboriginal communities	2010–12
7	Seek resources to improve water supplies for Aboriginal communities in line with assessment findings	Department of Water, Department of Housing, other government agencies and Aboriginal communities	2010–12
Outcome 1.3 Improved security for self-suppliers Refer to actions 12 and 13			
8	Develop drinking water source protection plans for all towns	Department of Water in collaboration with interested and affected parties	2010

Objective 1
Ensure security of water supply for the current and future needs of all water users.

Action number	Action	Agencies/organisations	Timing
9	Develop community layout plans for all Aboriginal communities	Department of Water, Department of Planning, Department of Health and Aboriginal communities	2010–12
Outcome 1.4 Improved understanding of and accounting for water use			
10	Assess the suitability of current water measurement information collected in the Pilbara to meet water accounting needs and improve where required	Department of Water	2010–11

Objective 2
Ensure that water use is balanced to meet environmental, social, cultural and economic values

Action number	Action	Agencies/organisations	Timing
Outcome 2.1 Balanced environmental, social, cultural and economic values for all water resources with the potential for multiple users through the completion of water allocation plans			
11	Review and model water resource availability and identify environmental, social and cultural water requirements for priority aquifers	Department of Water	2010–11
12	Develop water allocation plans for priority water resources	Department of Water in collaboration with interested and affected parties	2010–12
Outcome 2.2 Balanced environmental, social, cultural and economic values for all water resources where there is not the potential for multiple users through a continuation of water licensing and associated operating strategies			
13	Strengthen the technical ability of Department of Water staff to support effective and efficient licensing	Department of Water in collaboration with interested and affected parties	2010
Outcome 2.3 Accurate, timely and accessible information provided on both surface water and groundwater and on water planning and management			
14	Improve accessibility to groundwater monitoring information across the Pilbara	Department of Water in collaboration with industry	2010–11
15	Review groundwater bore monitoring and streamflow gauging networks and seek resources to upgrade, where required	Department of Water in collaboration with industry	2010–13
16	Improve access to water planning and management information	Department of Water	2010

Objective 3
Ensure that impacts, including cumulative impacts, are managed to protect the long-term health of waterways, aquifers, wetlands, springs, floodplains and estuaries.

Action number	Action	Agencies/organisations	Timing
Outcome 3.1 Overall management objectives set for waterways, aquifers, wetlands, springs, floodplains and estuaries			
17	Set management objectives for waterways and other waterbodies through the water planning and licensing process	Department of Water in collaboration with the Department of Environment and Conservation and other interested and affected parties	2010
Outcome 3.2 Improved understanding of environmental processes and their links with water resources, and translation of that into management actions			
18	Improve understanding of hydro-ecology in the Pilbara and share that information with interested and affected parties	Department of Water, Department of Environment and Conservation, Department of Agriculture and Food WA, mining, pastoral and research community	2010
19	Support the Department of Environment and Conservation's water-related biodiversity initiatives	Department of Water	2010
Outcome 3.3 Improved management of the cumulative impacts of development			
20	Prepare policy positions on managing cumulative impacts	Department of Water, Department of Environment and Conservation, mining, pastoral and Rangelands NRM	2010

Objective 4
Integrate land-use, infrastructure and natural resource management planning with water planning

Action number	Action	Agencies/organisations	Timing
Outcome 4.1 Land-use and infrastructure planning which recognises water management and availability			
21	Recognise water availability issues in regional growth strategies and other planning activities	Department of Planning, Pilbara Regional Development Commission, local government, Department of Water and Water Corporation	2010
22	Recognise water availability constraints in land-use planning, particularly the planning of open spaces	Department of Planning, Department of Water and Water Corporation	2010
Outcome 4.2 Key eco-hydrological processes are maintained to protect natural resource assets			
23	Include the maintenance of key eco-hydrological processes within the water allocation planning process	Department of Water, Department of Environment and Conservation and Rangelands NRM	2010–12
Outcome 4.3 Adequate flood-management planning and flood forecasting and warning			
24	Seek resources to upgrade the stream gauging network and flood forecasting	Department of Water and industry partners	2010–12

Objective 5
Recognise and protect Aboriginal and other heritage values associated with water

Action number	Action	Agencies/organisations	Timing
Outcome 5.1 Aboriginal people are engaged in water planning and management in a way that best suits Aboriginal people			
25	Establish engagement processes with Aboriginal people for high-priority aquifers	Department of Water and Aboriginal groups	2010–11
Outcome 5.2 Aboriginal and heritage values are recognised and protected in water-allocation plans			
26	Strengthen relationships with Aboriginal people to identify heritage and contemporary values associated with water	Department of Water and Aboriginal groups	2010–11
27	Strengthen relationships with Aboriginal people to develop management actions to protect their heritage and contemporary values	Department of Water and Aboriginal groups	2010–11
Outcome 5.3 A state policy on Aboriginal access to water			
28	Work with State agencies and aboriginal communities to support Aboriginal access to water	Relevant State agencies, Department of Water and Aboriginal groups	2010–11

Objective 6
Ensure the quantity and quality of water used is appropriate for the purpose for which water is being used.

Action number	Action	Agencies/organisations	Timing
Outcome 6.1 Best-practice water-use efficiency in outdoor water use for all coastal ports and towns			
29	Support implementation of water-wise measures in all coastal towns and ports with an emphasis on outdoor water use	Department of Water, Water Corporation, mining industry and local government	2010
30	Support local government to develop a framework for local government water-efficiency plan that are suitable for the Pilbara	Department of Water	2010
Outcome 6.2 Best-practice water-use efficiency at all mines and inland towns			
31	Support optimisation of water use in inland towns and mines with water surpluses	Department of Water, Water Corporation, mining industry and local government	2010

Objective 7:
Support high-value use by industry and agriculture with the least adverse impact

Action number	Action	Agencies/organisations	Timing
Outcome 7.1 Best-practice water use in all mining operations			
32	Implement *Pilbara Water in mining guideline*	Department of Water and mining industry	2010
Outcome 7.2 Best-practice water use in agriculture			
33	Support best-practice water management for pastoral diversification	Department of Agriculture and Food WA, pastoralists, Rangelands NRM and Department of Water	2010
Outcome 7.3 Moving water where this has a net benefit for water-dependent environmental, social and cultural values			
34	Support the movement of water where there is an environmental, social and cultural net benefit	Department of Water, Department of Environment and Conservation, mining industry, water service providers and Aboriginal groups	2010
Outcome 7.4 All water planning and source development to include energy conservation and greenhouse gas implications within the planning and development process			
35	Ensure water-source plans and operating strategies consider greenhouse gas implications and energy conservation measures	Department of Water, mining industry and water service providers	2010

For further information on whether funding is required to undertake actions, and their performance measures, refer to the Pilbara regional water plan – Supporting detail.

Review

The *Pilbara regional water plan* has been developed with a view to meeting the long-term water resource management needs of the Pilbara. It provides a strategic vision to 2030 and a five-year action plan to guide sustainable management of the region's water resources and water services.

The Department of Water will coordinate implementation of the action plan and prepare an annual report to outline progress against the actions. The progress report will be publicly available and reviewed by the Pilbara consultative committee, which includes representatives from government agencies, landholders, traditional owners and industry.

As the Pilbara is a dynamic region, the *Pilbara regional water plan* will have an inception review one year after it has been finalised (2011), a mid-term review and update in five years (2015) and will be fully revised in 10 years (2020).

Conclusion

The challenges we face in the Pilbara as a result of human actions, including climate change, are many. A clear, dynamic vision and careful planning can help the community to adapt to these challenges.

A shared vision, common purpose and strong partnerships in the region are the best ways to ensure healthy water resources and a sustainable environment for future generations.

References

Department of the Premier and Cabinet, 2007, *State water plan 2007*, Perth, Western Australia.

National Health and Medical Research Council, 2004, *Australian drinking water quality guidelines*, Canberra, Australia.

Western Australian Planning Commission, 2008, *Better Urban Water Management*, Western Australian Planning Commission, Perth, Western Australia.

Legislation

Government of Western Australia, 1986, *Environment Protection Act 1986*, Perth, Western Australia.

Government of Western Australia, 1914, *Rights in Water and Irrigation Act 1914*, Perth, Western Australia.

Government of Western Australia, 1995, *Water Services Licensing Act 1995*, Perth, Western Australia.

Available from the State Law Publisher (http://slp.wa.gov.au/index.htm).

Department of **Water**
168 St Georges Terrace, Perth, Western Australia
PO Box K822 Perth Western Australia 6842
Phone: 08 6364 7600
Fax: 08 6364 7601
www.water.wa.gov.au