

HUNTER REGION WATER RESOURCES SITUATIONAL ANALYSIS

SUMMARY REPORT

July 2024



Acknowledgements

We acknowledge the Traditional Owners of the Hunter region and their continuing connection to land, water, Country and culture. It is with the greatest of respect, we acknowledge Elders past, present, and emerging, and extend our deepest gratitude for the cultural, spiritual and education practices that continue to enrich communities.

We thank the many stakeholders who participated in interviews or shared their valuable insights with the project team.

While a variety of stakeholders were consulted, engagement with Traditional Owners on water use and management as part of this process has been preliminary. This preliminary consultation highlighted the need to deliver shared decision-making on water use and management with Traditional Owners.

The 2024 Water Resources Situational Analysis for the Hunter region of New South Wales was prepared with funding support from BHP. The WRSA was developed by the Centre for Climate, Land and Water, a joint initiative of Alluvium Consulting, and University of Newcastle.



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WATER — A SHARED RESPONSIBILITY

Water plays a crucial role in sustaining the Hunter community. The fertile lands in the Hunter region rely on water for irrigation, enabling the production of various crops, including grapes for the renowned wine industry. Water is also essential for mining and power generation, both of which are significant contributors to the region's economic prosperity.

The Hunter region's natural beauty and ecological diversity are highly dependent on water, with healthy rivers and wetlands providing essential habitat for wildlife, and recreational opportunities for residents and visitors alike. It is our collective responsibility to manage water resources sustainably so that First Nations People, local communities, the regional economy, and the stunning natural environment they depend on can continue to prosper.

Managing water for the collective good of the Hunter community requires continual collaboration and investment. Collaboration works best when there is a shared understanding of the **values** the region holds for the local people, and **challenges** different people and organisations experience in relation to water resource management in the Hunter region.

A sustainable water supply and healthy catchment can ensure the well-being and quality of life of the region's growing population, supporting domestic and industrial needs, and ensuring the vitality of this vibrant and dynamic area. To maintain these benefits and services, water and natural resource managers, and users must continue to collaborate to better understand and manage the various impacts that our shared use of local water resources brings, and to seize opportunities to manage adverse impacts and safeguard the region's future.

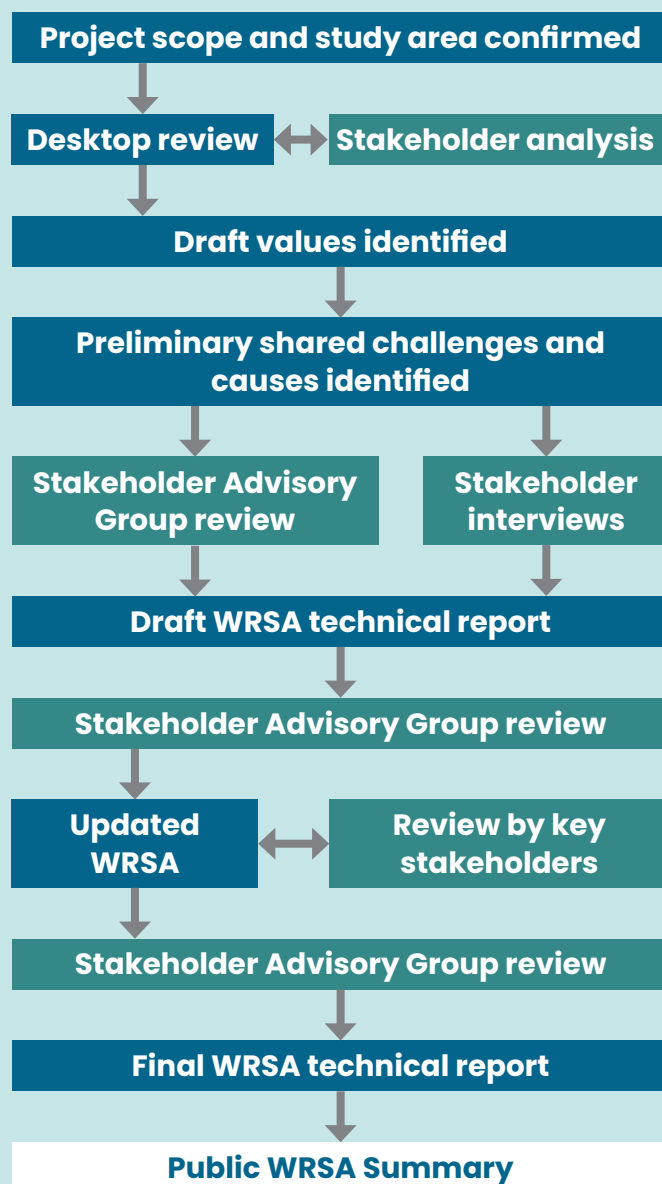
The results of this Water Resources Situation Analysis (WRSa) will help BHP, through their water stewardship program, to contribute to addressing shared water challenges that are most relevant to their operations and holdings. Regional stakeholders are also invited to contribute to their management by developing, implementing, and investing in actions that can help guide an ecologically sustainable future for the Hunter region.

BUILDING A PICTURE OF THE CURRENT WATER SITUATION

One way to promote collaboration and continual investment in improving water management is to undertake a water resource situational analysis (WRSA). A WRSA is an independent process that can provide a holistic summary of the sustainability, governance, and values of water within a region, and to identify shared water related challenges and opportunities for action. In addition to supporting regional collaboration, BHP will use this water resource situational analysis to continue to inform their own commitment and investment in water stewardship and sustainable water management in the region.

This process provides a platform for bringing key stakeholders together to identify and discuss their values and shared water challenges and, through the continued building of collaborative and constructive relationships, build commitment to addressing these challenges through action and investment.

The Hunter region Water Resources Situational Analysis was developed using publicly accessible and credible published information that was supplemented by data and information collected during a series of stakeholder interviews in 2023–24. Values and challenges were verified and refined with the assistance of a stakeholder advisory group.



WATER AND THE HUNTER RIVER CATCHMENT

The Hunter River catchment is the largest catchment in NSW covering an area of approximately 21,500 km². A complex network of surface water bodies, including rivers, streams, and wetlands, and a vast groundwater system characterises the catchment. Interactions between surface water and groundwater are essential processes in the region for sustaining the health of local riverine ecosystems and ensuring the availability of water resources for human use.

Water Storages

The NSW Government has invested heavily in storages to combat the threat of low reliability and drought in the region. Twenty-three dams are situated within the catchment for flood mitigation, hydroelectric power, irrigation, water supply and conservation purposes. The construction and operation of these dams has significantly altered the pattern and volume of flow through the system. The Hunter River is regulated by two major headwater storages, as well as several minor dams. Glenbawn Dam on the upper Hunter River, and Glennies Creek Dam on Glennies Creek which supply water for irrigation, town water, stock, and domestic supplies. Glenbawn Dam has a storage capacity of 749 GL which accounts for nearly half of the total water resources in the Greater Hunter region. Hunter Water Corporation treats water in the lower Hunter to a safe and usable standard, while Singleton Council, Muswellbrook Shire Council and Upper Hunter Shire Council provide water to the upper Hunter region.

Wetlands

The Hunter region is home to 37,938 ha of wetlands that play a critical role in maintaining the ecological health of the catchment, as well as supporting a wide range of aquatic and terrestrial species, including several migratory bird species. The Hunter Estuary is an internationally significant Ramsar site. The 45 ha Hunter Estuary Wetland was listed as a wetland of international importance in 2002 and is the receiving water body for the Hunter River in Newcastle.



Management

The Hunter River catchment is highly regulated through complex water sharing arrangements, and the Hunter River Salinity Trading Scheme (HRSTS). Water Sharing Plans set the rules for trading water between the environment, communities, and businesses, and provide a framework for managing the impacts of water use on other water users and the environment. The Hunter Regulated River is currently 100% allocated, and a number of performance indicators measure the success of strategies for reaching Plan objectives including the ecological condition of water sources, economic benefits, Aboriginal cultural benefits, and social and cultural benefits. The aim of the HRSTS scheme is to regulate salinity levels in the Hunter River by balancing the discharge of salt water into the river by industries and water extraction by downstream users, with the health of the river and its ecosystems.

Climate

The Hunter Valley is located in a unique area with overlapping tropical and temperate zones known as the MacPherson-Macleay Overlap. Generally, the Hunter region is mild to warm in summer, however winters are cool in more elevated and western parts of the region. Milder conditions occur along the coast which is typically associated with the warmest average winter temperatures and lower summer maximum temperatures in the region.

The Hunter Valley experiences considerable rainfall variability across the region, seasons, and from year-to-year. The region sits in a transitional zone between the winter-dominated rainfall in the south and summer-dominated rainfall in the north. Both extended droughts and flooding rains are within living memory. The first decade at the turn of the century saw the Millennium Drought. This was followed by two of the wettest years on record in Australia (2010–2011). There are two distinct seasonal trends, wetter in summer/autumn and drier in winter/spring.

This large spatial and temporal hydroclimatic variability in the Hunter region is due to the complex interactions between weather patterns in the region, the influence of larger-scale climate patterns (e.g. El Niño–Southern Oscillation), the topography of the valley, including the Liverpool Range and the Barrington Tops and the influence of sea surface temperature near the coast.

Increasing temperatures is one the main affects climate change will have on the Hunter region, with average, minimum and maximum temperatures expected to increase in both the near and far future. The temperatures in the Hunter region have risen since the 1960s, and the trend has continued with sustained higher temperatures in the more recent decades. Many models also indicate increasing autumn rainfall and decreasing winter rainfall.

Bushfire risks are also expected to increase in the region. The region's environmental and cultural values, and economic activities have already been identified as being vulnerable to the impacts of climate change. A high degree of uncertainty surrounds the impact of plausible future climate scenarios on water resources.



CATCHMENT COMPONENTS

The Coquun (Hunter River) weaves its way through the traditional Country of the Worimi, Wonnarua, and Awabakal Peoples who have lived in the region for thousands of years. Hundreds of culturally significant sites have been identified in the region.

The Goulburn River drains a drier part of the catchment, accounting for 40% of the Hunter catchment area, but just 23% of Hunter River's flow.

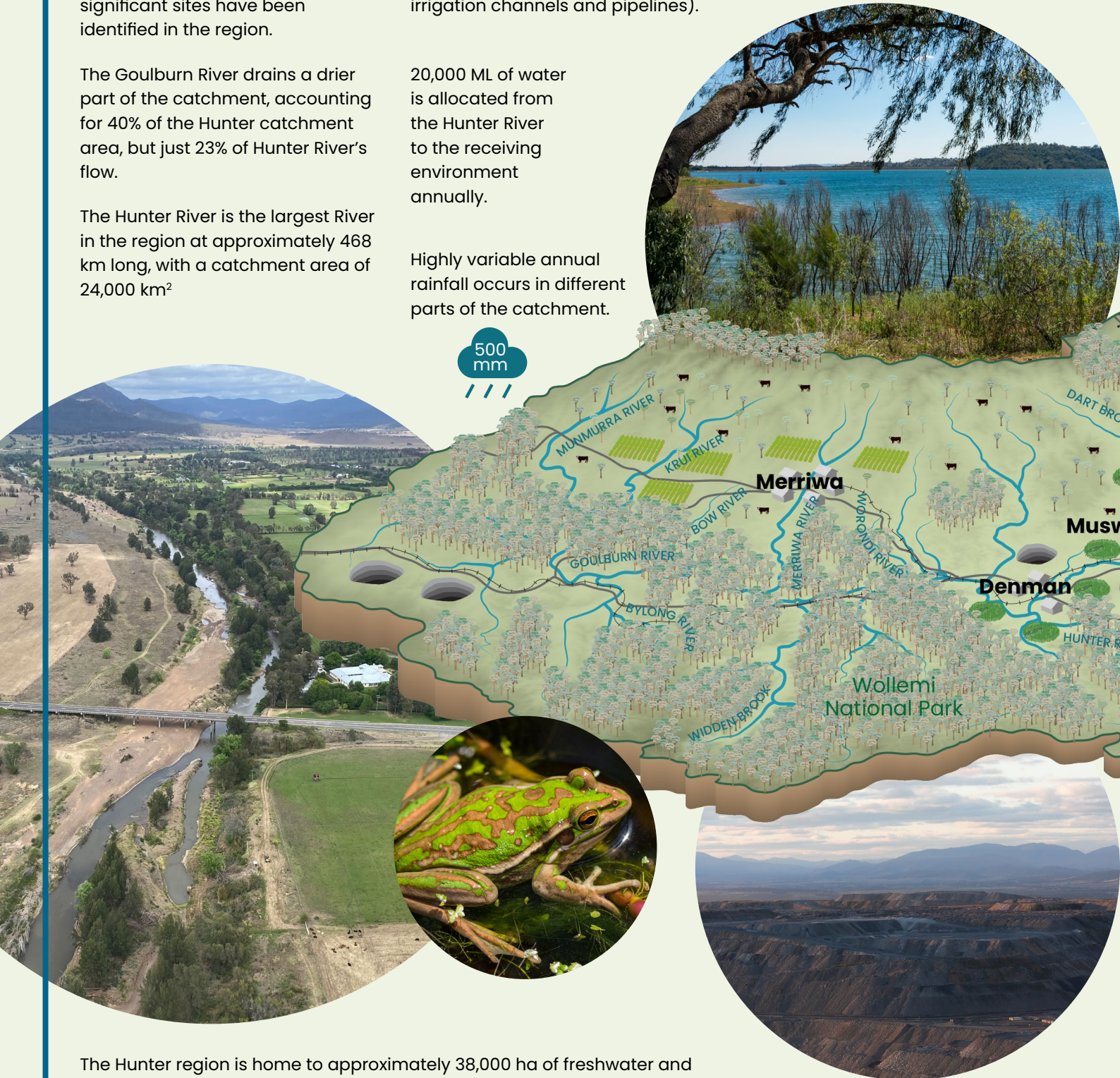
The Hunter River is the largest River in the region at approximately 468 km long, with a catchment area of 24,000 km²

Water in the Hunter region includes surface water collected by the natural landscape, groundwater, as well as water systems storage, flow regulation, and water distribution (reservoirs, dams, irrigation channels and pipelines).

20,000 ML of water is allocated from the Hunter River to the receiving environment annually.

Highly variable annual rainfall occurs in different parts of the catchment.

There are 23 water storages in total including 7 major water storages with a combined capacity of 1,469 GL.



The Hunter region is home to approximately 38,000 ha of freshwater and saltwater wetlands, including the 45ha Hunter Estuary Ramsar listed wetland. These receiving waters help reduce the impacts of floods, filter catchment run off, and provide important refugia for many species including the Australasian bittern, green and golden bell frog, estuary stingray, and the black-necked Stork

The Hunter region's unique geology means that there is a natural abundance of salts that leach into groundwaters and rivers.

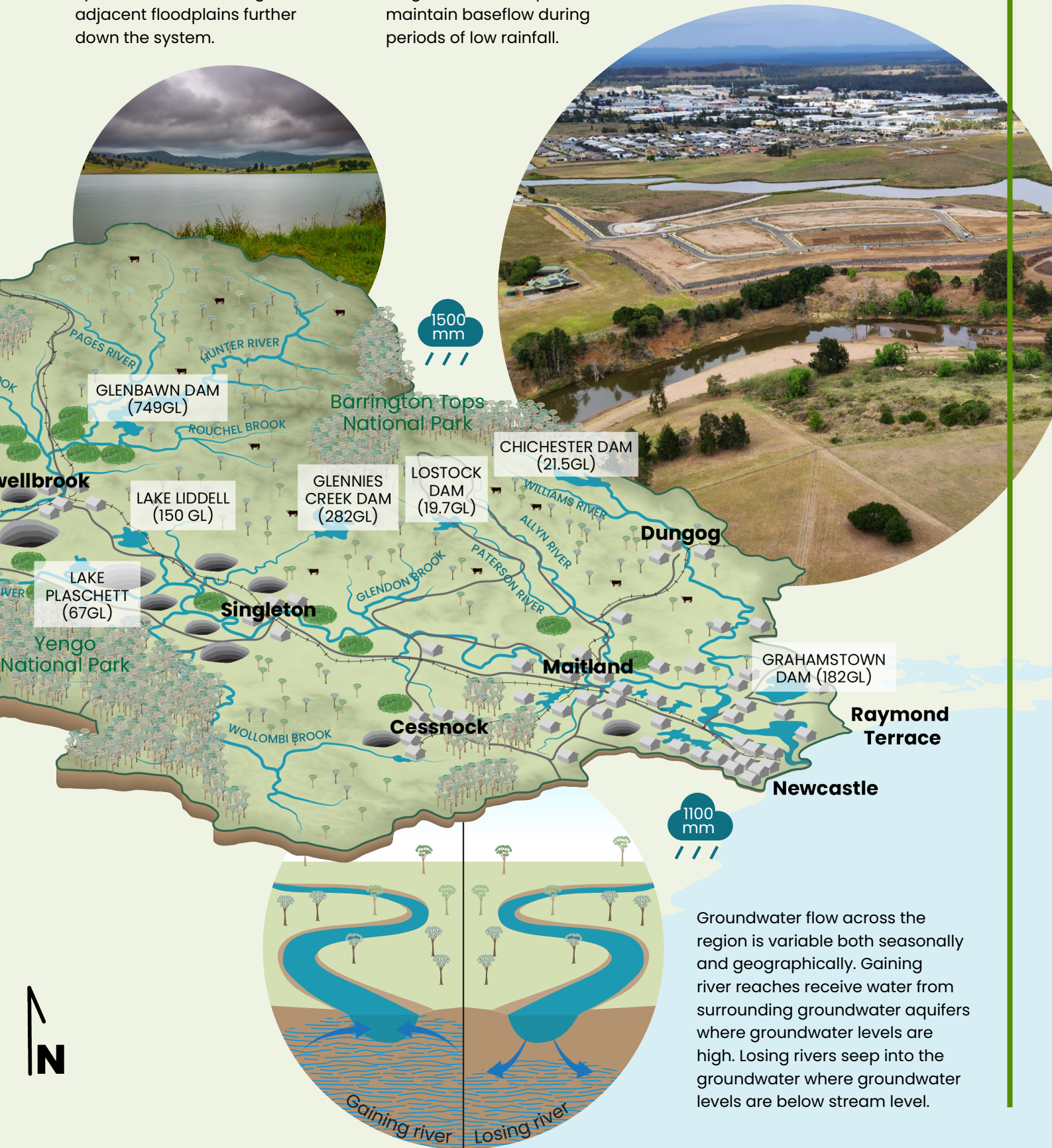
CATCHMENT PROCESSES

In the Upper Hunter, the alluvial aquifers can recharge rapidly during high-flow events, which infiltrate into the alluvial aquifers along the riverbanks, recharging the groundwater system and overflowing onto adjacent floodplains further down the system.

The region possesses some of the highest flash flood magnitude Indices recorded in the world.

Discharges are seasonal and waterways and species rely on groundwater aquifers to maintain baseflow during periods of low rainfall.

The interactions between surface water and groundwater in the Hunter River catchment are complex and dynamic. They are influenced by geology, topography, land use, and climate.



Groundwater flow across the region is variable both seasonally and geographically. Gaining river reaches receive water from surrounding groundwater aquifers where groundwater levels are high. Losing rivers seep into the groundwater where groundwater levels are below stream level.



Cultural and spiritual connections to land and sea country

If the water is healthy, Country is healthy. If Country is healthy then People and Culture will be healthy. Protecting and managing water and water-related resources has been a part of history for thousands of years and remains a collaborative and intergenerational responsibility. This spiritual obligation to care for water and waterways, above and below ground, is part of First Nations people commitment to Caring for Country.

We value the enduring connection that First Nations people have to Land, Sea, and Water. This connection provides a sense of wellbeing and belonging which forms their identity. Cultural connections remain strong through the stories, landmarks, lore and beliefs passed on from generation to generation. We value the significant cultural heritage sites and places in the Hunter Valley's aquatic landscapes including physical traces and artefacts (e.g. middens, art sites) of the Worimi, Wonnarua, and Awabakal people.



Healthy water-dependent ecosystems

We value the healthy habitats that support our incredible array of plants and animals including twelve groundwater dependent ecosystems, and the internationally recognised Hunter Estuary. Healthy wetlands, waterways and natural waterscapes underpin the provision of various ecosystem services for the local community including food and water security, economic opportunities, visual amenity, and leisure activities. Healthy and clean environments, animals and plants are essential for our prosperity, and the fate of many water dependent industries relies on healthy catchments. Endangered species and threatened communities also require healthy, resilient catchments to survive, and we value their presence in our landscapes.

WHY IS WATER IMPORTANT TO US IN THE HUNTER REGION

Six high level water related values have been identified during the study. These are shared water values and are intricately connected and dependent on one another. Our actions and activities can affect more than one value at the same time. Some impacts are direct and immediate others are indirect and may not become obvious straight away.



Reliable access to safe and secure water sources

We value sustainable water use for residential and economic purposes. We believe that water sources (including rainfall independent systems) should be reliable and resilient to changes in climate. We value sustainable extraction from ground and surface waters and seek innovation through rainfall independent systems that can support communities, and industry. We seek improved infrastructure solutions to improve access to water.

We want to become more resilient to climate impacts and continue to provide river flows that sustain downstream processes, habitats, and water dependent species, as well as the many industries that are present in our region. We value the opportunities that access to water can bring including expanding our existing industries or inviting new industries to our region to support employment and our quality of life.



What is a shared value?

A value is something that is important and meaningful (of value) to someone.

A shared value means that a specific value is held by and has been identified by more than one individual or organisation. They can include environmental, cultural, economic and/or social aspects.



Inclusive decision making

We value open and transparent engagement and involvement in decision-making processes. We see collaborative water governance as an effective and beneficial

means to ensure that communities and ecosystems thrive for future generations. The combination of diverse voices encourages holistic thinking and spending decisions for broader reaching solutions and multiple benefits. We value the opportunity to create potential to repurpose the land, which will diversify the regions job market and economy to build resilience and increase sustainability. We value First Nations voices in decision making for water and seek to preserve the spiritual, social, customary, and economic values that are important to Aboriginal people for future generations. We look forward to a future where trust and support is restored in the management of our water resources and land and water stewardship is supported by all.



Clean water

We value good quality water that can sustain our way of life, for current and future generations. The community values and benefits from good water quality through clean beaches and waterways for swimming, recreation, and the amenity provided by our beautiful waterscapes.

Good water quality safeguards agriculture, mining, energy production, forestry, fishing, tourism and other clean water dependent industries and reduces water treatment costs prior to use. The region's unique ecosystems and internationally recognised migratory waterbirds and shorebirds, the threatened green and golden bell frog, and the black necked stork depend on good water quality in receiving environments including wetlands, estuaries and beaches of the Hunter region. Good quality surface and ground waters support important foraging and roosting habitat for migratory shorebirds and native fish and frog populations.

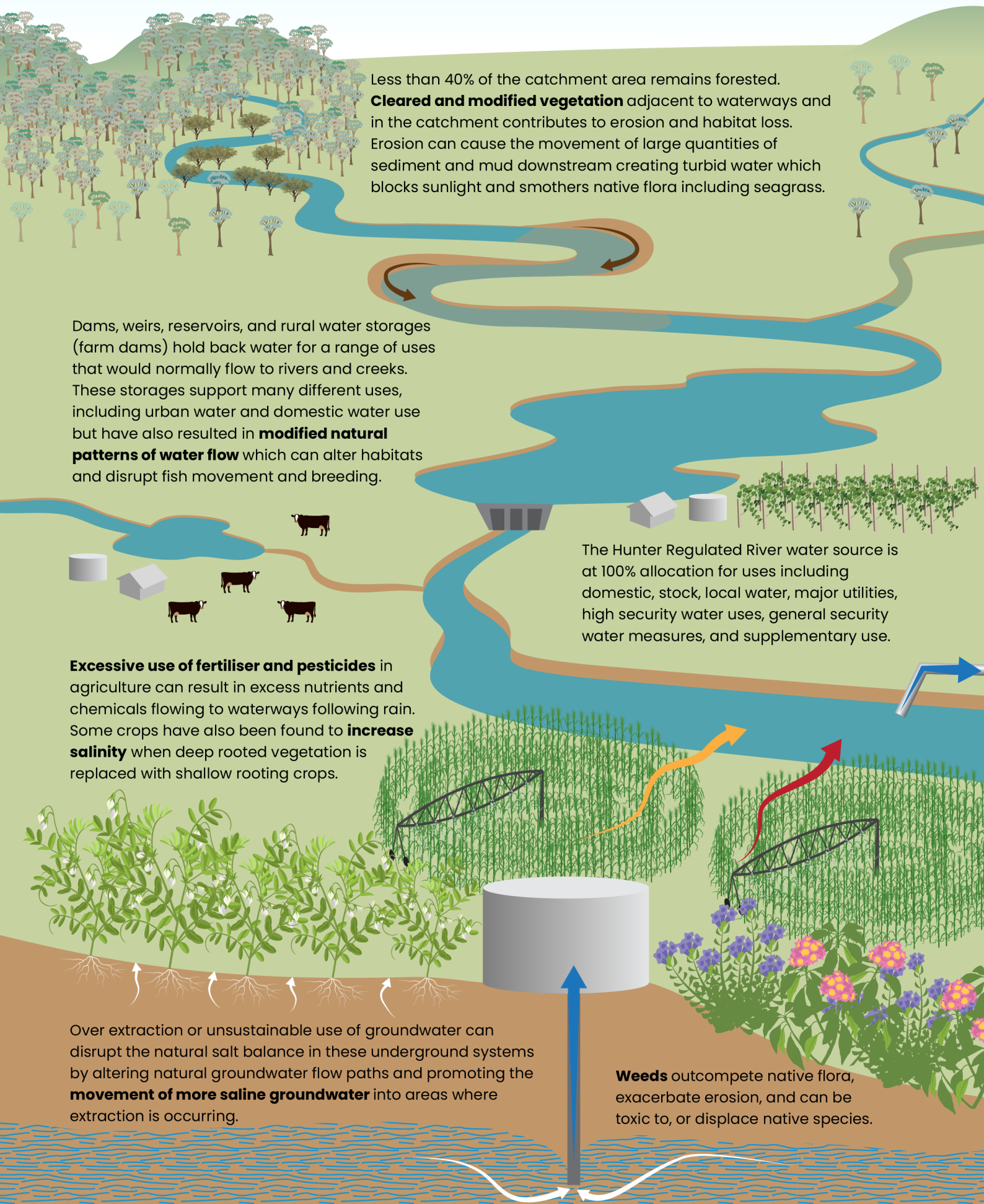


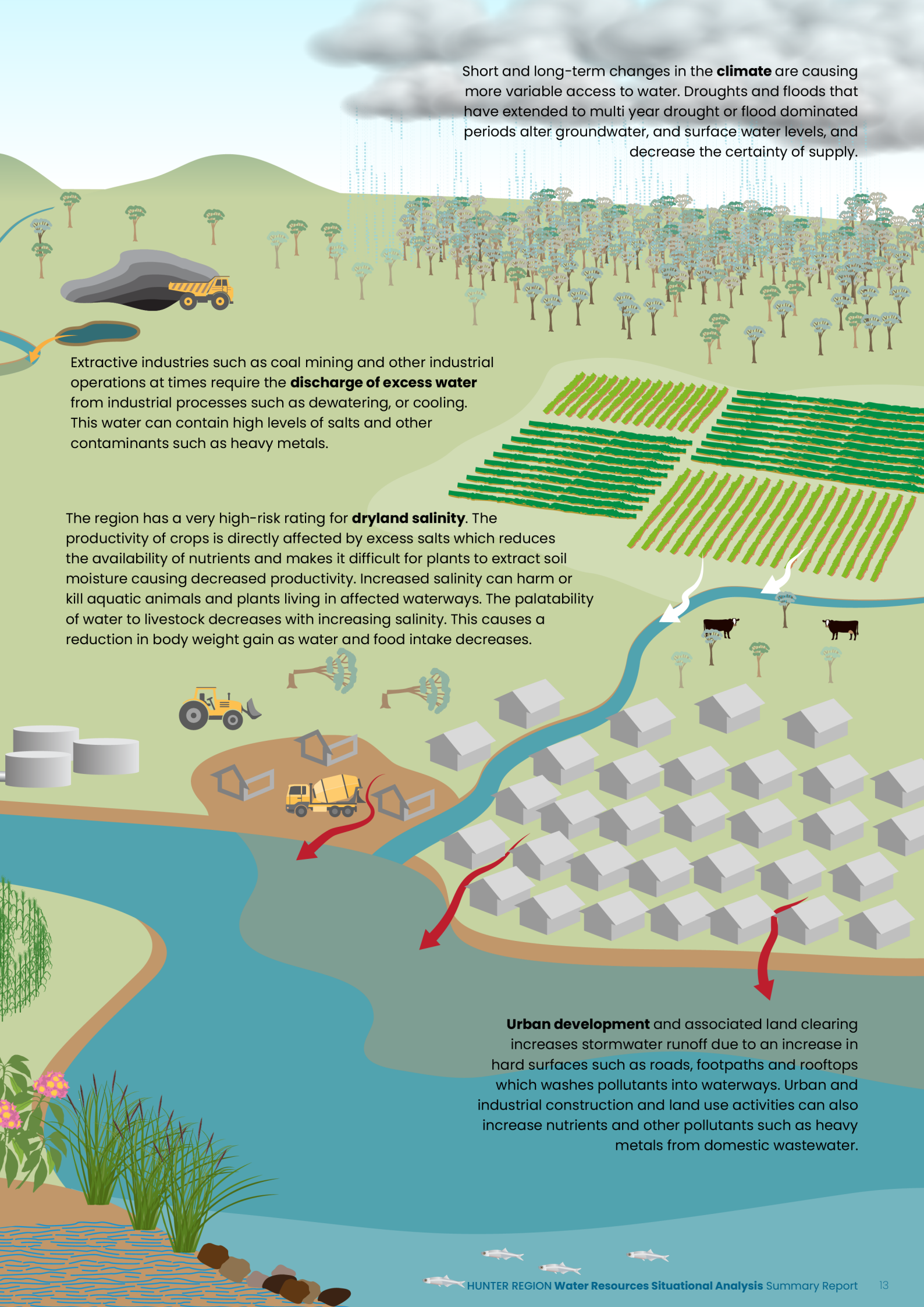
Sense of place, liveability and amenity

We value our natural areas that afford us a healthy lifestyle and a sense of place by providing places for swimming, sailing, surfing, diving, recreational fishing, nature-based trails, and sightseeing opportunities. We celebrate the regions position alongside the internationally significant and beautiful Blue Mountains World Heritage Area, and Hunter Estuary. Our waterways and wetlands are renowned for their beauty and ecological significance, and we appreciate the contribution that waterways provide to local climate control and visual amenity.

The liveability of our region is supported by a diverse range of economic opportunities, that are supported by our water resources. From the local boutique wineries, grazing and stud farms in Cessnock, to industrial and manufacturing opportunities in Newcastle, Maitland, and Port Stephens, coal mining and primary production in Singleton and Muswellbrook, the thoroughbred industry and cattle grazing in the upper Hunter, and primary production, forestry and fishing in Dungog and Gloucester. This diversity has underpinned a prosperous period of economic growth for the region which supports our lifestyle.

WHAT IS IMPACTING THESE VALUES IN THE HUNTER REGION





Short and long-term changes in the **climate** are causing more variable access to water. Droughts and floods that have extended to multi year drought or flood dominated periods alter groundwater, and surface water levels, and decrease the certainty of supply.

Extractive industries such as coal mining and other industrial operations at times require the **discharge of excess water** from industrial processes such as dewatering, or cooling. This water can contain high levels of salts and other contaminants such as heavy metals.

The region has a very high-risk rating for **dryland salinity**. The productivity of crops is directly affected by excess salts which reduces the availability of nutrients and makes it difficult for plants to extract soil moisture causing decreased productivity. Increased salinity can harm or kill aquatic animals and plants living in affected waterways. The palatability of water to livestock decreases with increasing salinity. This causes a reduction in body weight gain as water and food intake decreases.

Urban development and associated land clearing increases stormwater runoff due to an increase in hard surfaces such as roads, footpaths and rooftops which washes pollutants into waterways. Urban and industrial construction and land use activities can also increase nutrients and other pollutants such as heavy metals from domestic wastewater.

WHAT ARE THE BIGGEST WATER-RELATED CHALLENGES FACING THE HUNTER REGION?

This section provides a summary of what some of the community and interested parties have identified as a concern or challenge relating to water management in the region. If left unmanaged these shared challenges may adversely affect the region's values and future health and prosperity. The tables below provide a high-level overview of:

- What were the most important water-related challenges identified during this study.
- Which values will be most directly impacted by the challenge if not addressed.
- What the real or perceived adverse consequences or impacts are or could be if the challenge is not addressed in a timely manner.
- What are the known primary underlying causes of these impacts.
- Which sector in the community has either raised this challenge as a major concern, might be directly and adversely impacted by the issue, and/or can positively influence and help drive change.
- What actions are already underway that will potentially support improved outcomes in the future.

The next section in the document starts to identify some future opportunities for collaboration to address these challenges through collective effort and shared investment.



What is a shared challenge?

A shared water challenge arises when more than one stakeholder identifies that a value is being threatened or adversely impacted, or that a stakeholder's activities are seen to be in competition with the protection of a value.



FRAGMENTED WATER CYCLE PLANNING, GOVERNANCE, AND DECISION MAKING CHALLENGES

Interdependent and complex regulatory environment

Water management in the Hunter region sits within a complex statutory and non-statutory planning environment where there are many and varied interests across a large number of different public and private organisations, including the community who live and work in the region.

The current governance and decision-making arrangements were viewed to be highly fragmented across the water cycle. A lack of holistic planning and effective engagement has eroded the trust of Traditional Owners and local stakeholders and disincentivised further participation.

Consequences

- Siloed and complex regulatory environment in relation to the administration, protection, regulation and supply of water.
- A lack of coordination among water resource planning authorities leading to counterproductive or misaligned regulatory activity.
- Audits found multiple compliance issues with regulatory approvals in the Hunter River.

Causes

- Multiple agencies and numerous detailed Acts and regulations with interdependencies and historical precedents making interpretation and compliance difficult.

Lack of holistic planning

The administration, protection, regulation, and supply of water is lead by disparate arms of Government and there is minimal oversight for whole of catchment planning. Reviews conducted of the water governance arrangements by the productivity commission and researchers are critical of this lack of oversight. Stakeholders see the need for integrated monitoring and reporting, transparency in the way that data is shared and interpreted and improved management through collective governance arrangements. There is an urgent need to provide greater coordination, collaboration, and resource sharing across common strategic plans and other plans of management and across geographic locations in the region.

Consequences

- Minimal strategic direction and oversight for whole-of-system and values-based catchment planning.
- Limited implementation of integrated water planning or water sensitive urban design.
- Lack of integration between land use and water planning.

Causes

- Minimal oversight across the entire catchment including water resource planning and land use planning.
- Complexity of issues requires detailed knowledge which has necessitated involvement of key departments which have become siloed over time.

Lack of effective engagement in the region

There are increasing community expectations about values and the way that water should be managed. Engagement fatigue is identified as a key challenge by many stakeholders. Issues are not communicated transparently or effectively leading to deep mistrust in some areas.

Consequences

- Planning does not always adequately consider community and environmental values and priorities.
- The community finds messaging around water confusing and difficult to access.
- Residents feel disempowered and for some a lost sense of belonging in the community.
- Opportunities for increased water stewardship are lost.
- Lack of trust amongst stakeholders and engagement fatigue.

Causes

- Increasing community expectations and perspectives about the way that water should be managed and how they should be engaged.
- Lack of data sharing and transparency in the way data is interpreted.
- Trade-offs are not discussed and communicated openly.
- Complex water resource regulatory framework and no dedicated authority to disseminate information.
- Divide between decision makers and the community – a top-down approach to water management.

Impacted values



Relevant stakeholders



Traditional Owners (TO) and Aboriginal corporations and entities



NRM / land management



Resources / extractive industry



Business and economic development



Primary industry and industry bodies



Science and research



Other rural and commercial users



Utilities



Local government



Community-based NGO



NSW Government



Citizens and advocacy organisations

Current collective actions

The Hunter Estuary Alliance provides a platform for regional stakeholders to work together towards dedicated projects to the betterment of the estuary health, to improve resilience to the changing climate, and find balance in the complexity of multiple demands of the river. This organisation is a collaborative endeavour between local government and public authorities and is currently led by Maitland City Council. As progress occurs additional agencies may be included to improve reach and impact.

LACK OF INTEGRATION OF FIRST NATIONS PEOPLE'S ASPIRATIONS IN WATER PLANNING CHALLENGE

Lack of integration of First Nations people's aspirations in water planning

Cultural and spiritual connections to Land and Sea Country, including their storylines, songlines, lore and special places, vary between the numerous Traditional Owner and language groups of the Hunter region. They have both shared and individual aspirations and priorities for their Peoples.

These needs and aspirations are not well integrated in part due to the lack of opportunity for Traditional Owners and First Nations organisations to actively participate in water planning and management. This means there is limited integration of cultural values in local planning frameworks.

Consequences

- Limited integration of cultural values in planning frameworks.
- Potential impacts to cultural practices, sites of significance and values.
- Lack of meaningful input into Land and Sea Country management, including integration of cultural sciences with western sciences and practices.

Causes

- Insufficient timeframes associated with engagement.
- Lack of participatory process outlined for engaging local Traditional Owners.

Impacted values



Relevant stakeholders



Traditional Owners (TO) and Aboriginal corporations and entities



Resources / extractive industry



Primary industry and industry bodies



Other rural and commercial users



Local government



Science and research



Utilities



Citizens and advocacy organisations



Community-based NGO



NSW Government

Current collective actions

- The National Cultural Flows Research Project (NCFRP) combines scientific methodologies and cultural knowledge inform the development of new governance approaches to water management. The initial case study was for the Murray Darling with an intent for the process to be applied Australia wide. Several stakeholders form the committee from First Nations organisations, and public authorities. Project supporters are from State and Federal Government and Clayton Utz.
- The NSW Aboriginal Water Strategy, led by the NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW Department of Planning and Environment) is being co-designed with NSW Aboriginal peak bodies and Aboriginal organisations with water interests and feedback will be sought from the broader Aboriginal community. The strategy aims to empower First Nations people to contribute to water management and planning decisions and increase water rights. An expression of interest was circulated for local Aboriginal people in the Hunter to form an Aboriginal water committee late in 2023.

RESTORING AND MAINTAINING HEALTHY CATCHMENTS CHALLENGES

Uncertainty in changes to salinity levels outside of the existing Hunter River Salinity Trading Scheme

The region has a high risk of dryland salinity, in large part owing to local geology. Salinity impacts the quality of water for many industries, species, and the environment. Local industries are challenged to manage their contribution to salinity and in some parts of the catchment this is achieved through collaborative market-based approaches regulated by the Hunter River Salinity Trading Scheme. Some stakeholders are advocating for the scheme to be extended to other areas of the catchment where salinity levels are a concern.

Consequences

- Downstream impacts to water dependent ecosystems, including Ramsar wetlands.
- Dry land salinity impacts

Causes

- Natural sources of salinity in the catchment, which has a high risk of dryland salinity.
- Extended dry periods can concentrate salts in Hunter tributary systems.
- Land clearing, the interception and diversion of baseflows by surrounding industries, and the extraction of groundwater.
- Evaporative losses to mining voids and power cooling infrastructure concentrating salts.
- Open cut coal mining can exacerbate naturally high salinity levels by exposing saline rocks to runoff, accelerate natural leaching and weathering processes, and create changed flow paths.

Limited availability of water to support environmental flows during dry periods

River and groundwater flows are heavily influenced by climate and the impact of extended droughts are firmly in the minds of local stakeholders. The uncertainty associated with water availability means that providing environmental flows that can sustain important downstream habitats is challenging. Water flows must be timed to meet the specific needs of water dependent species. The Hunter Paterson Environmental Water Advisory Group help inform opportunities to assist, and hydrodynamic modelling has been completed for the Hunter Estuary to ensure the region is meeting its international obligations in relation to the Hunter Estuary Ramsar site. These flows will need to continue to be managed carefully as the climate continues to change.

Consequences

- Reduced resilience of downstream ecosystems.
- Important species are not supported through their breeding cycles.
- Loss of threatened species and ecosystems.

Causes

- Changing water tables due to climate variability.
- Reduced inflows from the catchment during extended dry periods.
- Interceptions and diversion of baseflows by surrounding industries.
- Interception and diversion of flow for flood mitigation purposes.

Poor water quality associated with urban centres, and agriculture, mining and industrial land uses, and a lack of riparian vegetation

The Hunter region was transformed upon European settlement through extensive clearing for agriculture. Now less than 40% of forested areas remain, and riparian corridors are devoid of trees in many areas. The demands on the catchments' waterways, and groundwater to receive runoff associated with modern-day industries, expanding urban development, and intensive land uses is high, and there is little in the way to buffer these impacts.

Urban centres such as Newcastle and Maitland are expanding with population growth. This means more sealed areas and less opportunities for treatment of water flows by vegetation. There is limited evidence of water sensitive urban design in many areas which provide treatment for stormwater flows. In addition, the construction period associated with development can have a large impact on water quality when erosion and sediment control is not optimised and increased wastewater treatment loads create a high risk of sewerage overflows during storms.

Agricultural land use can also impact waterways through land clearing, and erosion, herbicide and pesticide use and changing water tables through irrigation.

Consequences

- Limited treatment of runoff resulting in Increased turbidity and poor water quality.
- Impacts to downstream ecosystems.
- Habitat degradation and reduced biodiversity.
- Reduced fish stocks.
- Decrease in amenity.
- Increased downstream treatment costs.
- Rising salinity in groundwater and increased saline discharge to streams.

Causes

- Removal of riparian corridors.
- Vegetation clearing and erosion.
- Loss of groundcover.
- Extreme rainfall events resulting in high runoff, flooding, soil erosion, damage to vegetation, wet weather sewage overflows and septic system failure.
- Drought and or bushfire damaging vegetation.
- Point source contamination from sewerage treatment plants and septic systems, exacerbated by population growth.
- Stormwater contamination from established and new urban areas due to poor erosion and sediment control during construction and development, increased hard surfaces that convey polluted stormwater to waterways, and limited use of best practice urban development practices such as water sensitive urban design.
- Dryland, urban, and irrigated salinity.
- Salinity associated with industrial, and mining applications.
- Leaching of herbicides and pesticides into watercourses.

Polluted groundwater

There are many unknowns in relation to groundwater quality and quantity across the region. Groundwater quality is heavily influenced by the region's geology. A high degree of connectivity between surface and groundwater makes management difficult, and monitoring is not optimised. The cumulative impact of land use is of concern and many stakeholders believe that groundwater is not sustainably managed. There is limited publicly available information that demonstrates the condition of resources region wide.

Consequences

- Limitations to the future use of groundwater resources by industry, and community.
- Unknown impacts to local and downstream water dependent species.
- Adverse impacts to surface water quality due to interactions with saline groundwaters.

Causes

- Natural sources of salinity in the region's geology
- Land cover and land use contributing to rising groundwater levels and the discharge of salts to groundwaters in some areas.
- Cumulative impacts associated with the resources and extractive industry.

Barriers to fish passage

Extreme flooding events of the past have led to the placement of lifesaving infrastructure to prevent widespread flooding in the catchment. The catchment contributions scheme ensures that ratepayers fund these important flood mitigation works. The scheme also acknowledges the impact to fish passage and waterway health and supports several programs including wetland rehabilitation, riparian and river health works, community education, capacity building and engagement (including Aboriginal engagement), and on-ground incentives programs to support landholders to undertake on ground works. WaterNSW and the NSW Department of Planning and Environment (supported by the University of Newcastle) also plan water releases from Glenbawn Dam to support fish migration. Balancing the need for flood protection with the needs of fish passage to support important species will be an ongoing challenge for the region. Weeds also impede flow and must be managed carefully especially around wetlands.

Consequences

- Physical barriers interrupting fish passage and disrupting breeding cycles.
- Impacts to fisheries.

Causes

- Interrupted flow of water due to the presence of levees, bridges, culverts, dams and weeds and invasive species.
- Insufficient flow during drought periods and modified natural hydrology.

Impacted values



Relevant stakeholders



Traditional Owners (TO) and Aboriginal corporations and entities



Resources / extractive industry



Primary industry and industry bodies



Other rural and commercial users



Local government



NSW Government



NRM / land management



Science and research



Utilities



Community-based NGO



Citizens and advocacy organisations

Current collective action

- The NSW Groundwater Strategy Implementation Plan 2023–25 seeks to expand groundwater monitoring infrastructure to meet current and future management needs. This work is being led by the Department of Climate Change, Energy the Environment and Water (formerly the Department of Planning and Environment), in collaboration with Hunter Water, WaterNSW and local councils.
- Water release from the Glenbawn Dam in June, 2023 at the optimum water temperature and time of year to assist fish in moving downstream over key fish barriers enable seasonal fish passage. Water NSW is leading this work on behalf of the NSW Government, in partnership with the University of Newcastle.
- A hydrodynamic and water quality model is being developed for the Hunter River Estuary. This work is being led by the Hunter River Estuary Hydrodynamic Modelling Platform Committee, a collaboration between researchers (led by the University of New South Wales) and the Office of Environmental Heritage, Science Research Group.
- The Hunter Estuary Coastal Management Program led by the Hunter River Estuary Alliance is leading the development of a program of works to support estuary management objectives.
- The Hunter Valley Flood Mitigation Scheme seeks to mitigate flooding by controlling the velocity, direction, and depth of floodwaters, reduce disaster risk, and repair local tributaries from erosion. The scheme consists of 185 km of levees and control banks, spillways, drainage channels, floodgates, and also supports 36km of bank protection works to protect life and property from the impacts of flooding. This work is led by the Department of Climate Change, Energy the Environment and Water (formerly the Department of Planning and Environment).
- Hunter Rivers Salinity Trading Scheme was introduced in under the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002. The aim of the scheme is to regulate salinity levels in the Hunter River – to balance discharge of salt water into the river by industries with water extraction by downstream users, and the health of the river and its ecosystems. It works by distributing a finite number of salt credits that allow salt water to be discharged into the Hunter River. Industries can buy and sell (trade) these through an online portal in response to river flows and discharge requirements. It applies only to the Hunter River area between Singleton and Glenbawn Dam. The scheme is overseen by a committee of representatives from mining, energy, irrigators, an environmental representative and a Water NSW representative.

ACCESS TO SUSTAINABLE AND CLEAN WATER CHALLENGES

Unreliable water supply

Variable rainfall and extreme events are within lived experience. Some modelling indicates that there will be an increase in autumn rainfall (near (2030) and far (2070) future) and a decrease in spring (near future) and winter (near future) rainfall, though significant uncertainty remains. Evaporation is also predicated to increase. Climate change makes planning for access to water challenging, and there are increasing demands for higher standards of sustainability associated with operational water use and the supply of sufficient water to sustain the environment. Population growth in urban centres is putting increased pressure on supply and more rainfall independent systems are sought by the community.

During extended droughts the alluvial aquifer levels can drop significantly which can also lead to an increase in salinity. Flooding mitigation infrastructure also reduces water for the environment, and flooding increases the turbidity of water, increasing treatment costs.

There is growing competition for water and access is deemed a major impediment to economic diversification, and expansion in the region which affects liveability. Water storages are also not always located where large water users reside, and the distribution network is making access to supply challenging.

Consequences

- Compromised reliability of supply.
- Water restrictions.
- Flood mitigation infrastructure.
- Reduced resilience.
- Reduced environmental flows for biodiversity and ecosystem health.
- Economic diversification impacts.
- Competition for access to water.
- Quality of water insufficient to support domestic, commercial, agricultural, and industrial uses, reducing the opportunity for economic diversification.

Causes

- Variable rainfall and more frequent extreme events.
- Population growth in urban centres.
- Budget constraints
- Changing industry composition and increased demand for agribusiness.
- Uncertainty regarding future land use and water entitlements.

Over extraction of surface waters and ground waters

Compliance Issues with approval conditions relating to water take in the Hunter is high, and the complexity of the water regulatory system is considered to be a key issue in this regard. There is limited understanding of the cumulative impacts of drawdown from various industry groups.

Consequences

- Reduced environmental flows for biodiversity and ecosystem health.
- Algal blooms
- Lost economic opportunities

Causes

- Cumulative impact of various land uses accessing water resources.
- Uncertainty of future water availability due to changing climate.
- Complexity of water regulatory system.

Under-utilisation of available water allocations

Water associated with the Hunter Regulated River is fully allocated and access to supply is threatened further by extreme periods of wet and dry. Water entitlements do not always consider the temporal water needs of activities which may decrease over the life of an activity.

Consequences

- Market trading is active during droughts but not at other periods.
- Difficulty to expand existing industries or attract new industries to the region.

Causes

- Entitlements do not consider the temporal needs of activities where water needs decline over time.
- Businesses holding onto water for security of supply.
- Water entitlements do not consider multiple use cases.

Lack of critical infrastructure to support network

To achieve long-term water security the region needs to be better connected to available water supplies. Many industries are located in areas that are disconnected from supply and in parts of the catchment where rainfall yield is low. Increasing network connectivity to piped water from high yielding catchments is one way of improving access to water. The NSW Government is currently preparing business cases for the construction of a potable pipeline between Hunter Water Corporation and Singleton Council, and a pipeline connecting Lostock and Glennies Creek Dams through the State Infrastructure Strategy.

Consequences

- Water is fully allocated.
- Inability to attract new industries or expand existing uses.

Causes

- Water network infrastructure does not service high demand locations.
- Inadequate number and size of storages to meet demand.

Impacted values



Relevant stakeholders



Traditional Owners (TO) and Aboriginal corporations and entities



Resources / extractive industry



Primary industry and industry bodies



Other rural and commercial users



Local government



NSW Government



NRM / land management



Business and economic development



Science and research



Utilities



Community-based NGO



Citizens and advocacy organisations

Current collective action

- Water sharing plans regulated under the Water Management Act 2000, govern the use of water in the region through the provision of rules for sharing water between the environment, communities, and businesses, and provide a framework for managing the impacts of water use on other water users and the environment. These are governed by the NSW Government Department of Climate Change, Energy the Environment and Water (formerly the Department of Planning and Environment), for action by multiple water entitlement holders.
- The Hunter and Central Coast Enabling Regional Adaptation report, outlines opportunities for communities, governments, and business to adapt, including for water security. The report provides practical adaptation opportunities for government, business and community around themes such as Indigenous Peoples cultural values, circular economy, community resilience, emergency management, industry transformation, planning, protection of natural systems and environments, transport and infrastructure, and water and water security. This work is led by the NSW Government.
- A State Infrastructure Strategy has been developed by Water Infrastructure NSW and Hunter Water Corporation and includes the preparation of business cases for the construction of a potable pipeline between Hunter Water Corporation (HWC) and Singleton Council, and a pipeline connecting Lostock and Glennies Creek Dams.

COLLECTIVE ACTION OPPORTUNITIES TO ADDRESS CHALLENGES

The WRSA has identified several examples of collective actions already being undertaken collaboratively by stakeholders across the Hunter region. Despite this important work, the shared challenges and their causes identified during the study prompted further discussion regarding opportunities for future effort and investment. The opportunities for collective identified below each require additional discussion with key stakeholders. Regional stakeholders are invited to contribute to the management of these collective actions to help guide an ecologically sustainable future for the Hunter region.

Fragmented water cycle planning, governance, and decision making

- Support the development of a collaborative model (independent healthy waterways partnership) that can provide integrated monitoring and reporting. An independent partnership and monitoring program could support unbiased scientific communications to a broad audience to support capacity building. The outputs of this program can **provide an evidence base for improved governance, policy improvement, waterway health, and water security.**
- Stakeholders responsible for monitoring programs are encouraged to **share data to improve knowledge** of groundwater and surface water resources and water quality.
- Provide greater **coordination, collaboration, and resource sharing across common strategic plans** and other plans of management and across geographic locations in the region.
- **Close the engagement loop.** All levels of Government, and industries are encouraged to report progress to stakeholders, make monitoring and evaluation reporting and timeframes transparent, and commit to proposed changes that have been raised with community, to avoid consultation fatigue.

"some of the policies really need to be pulled apart to have a look at exactly how they're affecting the systems and the aquifer."

"There are lots of different ideas and recommendations that have been made for how to better manage and use water resources in the Hunter.....but the barrier is that these different things are done in silos and don't complement each other or build on previous work (and often they overlap with or contradict each other)"

"You're always then only getting part of the story or various stakeholder groups are overly consulted, and you know there's consultation fatigue probably at times. So can you do that better by bringing all those players together in a more neutral forum, which then isn't necessarily driving the agenda of one business or one industry or what have you but a more genuine attempt to try and bring all the stakeholders together."

Representation of First Nations people in water planning

- Non-First Nations individuals and organisations should **invest in cultural awareness training** to build individual and organisational capacity in areas such as truth telling, the history of colonisation, understanding cultural lore, values, language and aspirations, and respect building.
- individuals and organisations **respect the time required** to ensure all parties have the appropriate capacity and capability to participate in regional dialogue and engagement processes that are inclusive and equitable.
- Where **positive and proactive engagement** has already commenced, it is important that this continues with local Traditional Owner organisations and identify opportunities to share lessons and outcomes with others in the region.
- Provide permanent **protection for culturally important areas** and consider opportunities for providing access to these areas to First Nations people.

"where there's a big glaring gap and historically is with indigenous engagement ... so that that I think needs to be a much bigger consideration"

Restoring and maintaining healthy catchments

- Develop **end of catchment targets** for water quality and quantity and **establish land cover and riparian vegetation corridors**. Investment and collective actions should be aimed at the achievement of these targets.
- Improve and support the uptake of **best practice management** in farming communities.
- **Invest in blue green infrastructure** in urban areas to slow down flows, recharge groundwater, improve water quality, support biodiversity, and **reduce water discharge** associated with operational water use where feasible.
- Provide an open and inclusive environment for relevant stakeholders to come together and **stimulate whole-of-water cycle thinking and innovation** in the region.
- **Continue monitoring and support for implementation of the Hunter River Salinity Trading Scheme**. Maintaining associated forums will ensure ongoing collaboration, and sharing of ideas with knowledgeable actors that are aware of the history and context of the scheme. The committee may also **consider the merit of extending the HRSTS to other areas**, including the Goulburn River.

"Broadly, I think that what's needed for the region is a sort of a whole of catchment rehabilitation vision. Twenty years ago, the state government did have what they called an optic plan for the Hunter for post mining rehabilitation on a landscape scale."

"communities of practice are really helpful ... They're about saying we've got these really, really challenging issues. What can we do collectively to resolve those issues"

Access to sustainable and clean water

- Continue to **improve groundwater monitoring and extent** to support the expansion, and accuracy of modelling and protect important groundwater recharge zones.
- **Reduce leakage and transmission losses, and implement water conservation measures** across the water network, all industries, and communities.
- Undertake and **implement integrated water management planning** across the region that can make better use of available water resources.
- Investigate opportunities for the phased reduction of water use and **trading of allocations** in relation to planned operational usage.
- **Advocate for a more cohesive policy environment** to ensure that National and State level priorities can be met with on ground action and local priorities can be reflected in state level planning.

"I think it just comes down to, and how this is navigated I don't know, but agreement on what is the highest value water use. I think we kind of know that the Hunter River is an allocated river, it's allocated for various users ... that's one of the challenges that the community as a whole has to work through. And they're not easy decisions. Not easy discussions to have. It's very difficult, it's easier when it's raining a lot, and people are less concerned about water. It's very challenging now when it's dry."

"Unfortunately, in the Hunter, even though there have been periods when they've put money into monitoring groundwater and mapping groundwater, also surface water use and so forth, it's a stop start type of approach. And unfortunately, there's been a lot of lost opportunities from the point of view of collecting some good data to ... make decisions based on that sort of information."



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