



# MIRAGES IN THE NORTH

## ENDING THE NORTHERN MYTH

A CRITICAL REVIEW OF THE MISPERCEIVED ROLE OF  
NORTHERN AUSTRALIAN WATERWAYS IN DEVELOPMENT





## PUBLISHING INFORMATION

Report prepared for the Territory Rivers Keep 'Em Flowing alliance.

Published in 2023

### Front cover image:

irrigation crops near Kununurra on the Ord River, Western Australia. Credit: Alamy

### Back cover image:

The Daly River in the Northern Territory. Credit: Jason Fowler

### Authors:

Dr Daniel Gregg (Heuris Pty. Ltd.)

Mr Daniel Hill (Heuris Pty. Ltd.)

### Reviewers

Prof Jeff Connor (UniSA)

### Disclaimer

This report is prepared for the Territory Rivers: Keep 'em Flowing alliance in good faith and on the basis of available information. While the presented information in the document has been formulated with all due care, the users of the document must obtain their own advice and conduct their own investigation and assessments of any proposals they are considering, in the light of their own individual circumstances.

Territory Rivers: Keep 'em Flowing is an alliance of non-government organisations including the Pew Charitable Trusts and the Environment Centre NT (ECNT).

The conclusions and recommendations in this report are based on information available to the authors. Recognising that some of the information is provided by third parties, the author takes no responsibility for the accuracy, currency, reliability and correctness of the information in the document as provided by third parties.

Heuris Pty. Ltd. does not make any representation concerning the appropriateness of this report for anyone other than the organisations which are part of Territory Rivers: Keep 'em Flowing. If anyone other than these organisations chooses to use or rely on it they do so at their own risk.

© 2023 Heuris Pty. Ltd.



# CONTENTS

<b>EXECUTIVE SUMMARY</b>	<b>4</b>
Relevance to current and historical policy programs	5
Key Findings	7
Key Recommendations	10
Conclusions	10
<b>1 REPORT OVERVIEW</b>	<b>11</b>
1.1 Objectives	12
1.2 Review questions	12
1.3 Methodology of this report	13
1.4 Overview of findings	15
<b>2 A SHORT HISTORY OF 'DEVELOP THE NORTH' PROGRAMS</b>	<b>21</b>
<b>3 CURRENT POLICY &amp; VALUE PERSPECTIVES IN WATER ASSET DEVELOPMENT</b>	<b>25</b>
3.1 Policy objectives and program impact pathways concepts	27
3.2 Intermediaries vs Beneficiaries	31
3.3 Defining beneficiaries	33
3.4 Assumed impact pathway	35
3.5 Northern development objectives, associated beneficiaries, and assumed pathways to achievement	37
<b>4 METHODOLOGY</b>	<b>41</b>
<b>5 EVALUATING NORTHERN WATER CASE STUDIES</b>	<b>45</b>
5.1 Performance of proposed and funded projects	46
5.2 Construction timelines and scaling of irrigation operations	46
5.3 Returns from agriculture	49
5.4 On-farm and supporting infrastructure costs	49
5.5 Employment outcomes	50

<b>6 REFLECTIONS ON UNDERLYING PERFORMANCE ASSUMPTIONS</b>	<b>54</b>
6.1 Optimism Bias in project investment/performance assumptions	55
6.2 Pathways to impact not based on appropriate conceptual or empirical models	57
6.3 Governance concerns pervade northern development and water asset decisions	58
6.4 Foregone cultural and environmental value of the water assets	59
<b>7 WORKING TOWARD AN IMPROVED DEVELOPMENT MODEL FOR NORTHERN AUSTRALIA</b>	<b>61</b>
7.1 Addressing optimism bias in future water asset projects	62
7.2 Improving governance	62
7.3 Consideration of other policy options	64
7.4 Establishing future 'northern development' programs	65
<b>8 CONCLUSION</b>	<b>69</b>
<b>KEY TERMS</b>	<b>73</b>
<b>REFERENCES</b>	<b>75</b>



# EXECUTIVE SUMMARY

**N**orthern Australia is a unique region renowned for its outstanding and globally significant natural and cultural values. Central to many of these unique values are the intact rivers and floodplains of the north and their boom-and-bust cycles of flooding and dry. These same rivers and lands have also long been viewed as resources that can support an unrealised opportunity to provide for economic development. This view has invariably been one based on establishing a new industrial scale food and fibre agricultural frontier to rival the Murray-Darling basin through irrigated agriculture. The 'food-bowl' vision remains the basis of successive government policies that together form the Northern Development Program (NDP).

This report provides a review of the outcomes, objectives and technical rationale of the NDP, including whether those objectives remain appropriate in the modern era. We examine the underpinning policy frameworks of the NDP against best practice, evidence-based development theory and experience, and critically examine core assumptions.

Our review finds that many proposed irrigated agriculture projects not only fail to meet environmental and social objectives, but also fail on standard economic and financial performance expectations for public investment programs. We find a strong likelihood of worse outcomes for disadvantaged people living in northern Australia through the implementation of NDP projects.

**There are many positive, but loosely defined, policy objectives related to the NDP that seek to benefit people, culture and the environment in Northern Australia. However, the plans and strategies to achieve these goals are neither evidence-based nor effective.**

The likely sources of failures in these plans and strategies arise from incomplete reviews of development pathways, and substantial optimism bias leading to overstating the importance and effectiveness of irrigated agriculture as a development pathway. In the context of growing development pressures on northern Australian rivers driven largely by NDP aligned projects, a review of strategies and priorities for northern development is now urgent.





## RELEVANCE TO CURRENT AND HISTORICAL POLICY PROGRAMS

The critique of the idea of northern Australia as a new fibre and food bowl is not new. The idea itself has long been labelled by many independent reviewers as a 'northern mirage' or 'northern myth'. Despite these critiques and decades of failure alongside mounting evidence of environmental damage and a lack of social benefits, this myth continues to have a central role in government policy.

Most recently, in 2015, the Abbott Government outlined a new Northern Development Program in the 'Our North, Our Future: White Paper on Developing Northern Australia' (the 'White Paper'). This program, it was envisioned, would end an explicitly acknowledged streak of project failure through a program of massive Government support. Yet the vision of the White Paper appears at odds with the mechanisms chosen to achieve those goals. Indeed, the White Paper describes a program of investment that is largely undifferentiated from those that it acknowledges as having failed.

Now in 2023, we are facing increasing awareness of the twin climate and biodiversity crises; heightened concern about preserving Indigenous heritage; a failure to meet most Closing the Gap targets; and an Australian Government commitment to zero new extinctions. The Australian Government has also committed to releasing the first wellbeing federal budget that will include indicators that measure broader quality of life factors in addition to, not instead of, traditional macroeconomic measures. **However, the Northern Development Program remains the driving policy for northern Australian development.**

**In May 2023, the Australian Government announced a refresh of the 'Our North, Our Future: White Paper on Developing Northern Australia'.**

The urgency of this review is exacerbated by a range of water extraction and irrigation proposals related to and supported by the NDP that are currently under consideration in northern Australia.



These include the Ord River Expansion Stage 3 in Western Australia and the Northern Territory, recent applications to extract water from the Roper River in the Northern Territory, and the granting of 40,000 ML of groundwater for irrigated agriculture in Western Davenport, NT.

The Northern Territory Government has recently released draft plans to increase the take of wet season water and facilitate more dams on tributaries and floodplains with a stated goal of increasing irrigated agriculture with water from major rivers, while the Western Australia Government is contemplating a water allocation plan for the Martuwarra Fitzroy River to facilitate a major expansion of irrigated agriculture. If implemented as currently proposed, these developments are likely to lead to a permanent diminishment of the capacity of northern Australian communities to seek sustainable, self-determined development pathways whilst also damaging the Australian Government's global environmental credentials.

**This report raises concerns regarding the potential for harm to the existing, and future, economic development potential of northern Australia derived from a continued focus on irrigation development.**

The analysis suggests that whilst the stated objectives of the NDP are commendable, these goals are failing due to a multiplicity of factors, but most obviously due to the retention of a singular focus on irrigation as the core pathway. This includes unvalidated assumptions about positive development outcomes for people living in northern Australia through 'trickle-down' or 'rising tide' impact pathways – which are largely retained from historical northern development programs that have been acknowledged as failures, including prominent statements of historical failures within the White Paper itself.

Below: Ord River irrigation project, Western Australia; Credit: Alamy





**Considerable evidence summarised in this report and reviews of previous northern development programs finds very little ‘trickle-down’ to beneficiaries from investment in large irrigation infrastructure.** This continues to lead to great overstatement of public benefits likely to flow to intended beneficiaries and a perpetuation of ‘optimism bias’, where costs are underestimated and benefits overstated.

## OBJECTIVES OF THE NORTHERN DEVELOPMENT PROGRAM

The NDP has clear and laudable objectives based on inclusivity, sustainability, and economic development in a culturally sensitive way. Specifically, the White Paper makes clear statements of the need to:

- Act in the best interest of all communities and people living in northern Australia;
- Support investments that generate higher levels of local employment;
- Ensure that critical natural assets are maintained (environmental sustainability);
- Support First Nations values associated with culture, health, education and economic independence.







This report finds that most of the stated goals of the NDP remain relevant. In particular, those relating to a focus on benefits to people within the region and maintaining high cultural and environmental values. **However, these goals are loosely stated and appear more as a poorly founded justification of the NDP than as explicit performance indicators for investments and programs.**

Evidence reviewed in this report suggests that core assumptions about the effectiveness of proposed NDP development pathways are incorrect. Indeed, a substantial body of credible evidence contradicts the core NDP impact pathway assumption that irrigation water extraction and infrastructure will substantially improve wellbeing for the intended beneficiaries.

**Our review of past and proposed projects shows that few, if any, irrigation projects are likely to show positive financial returns - many are instead likely to show negative financial returns, and little public benefit through social, economic, or employment outcomes.**

There are strong incentives for private proponents of projects to exaggerate the benefits of their proposed projects to the public, whilst oversight mechanisms are missing, obscure or failed. The selection of inappropriate intermediary-based program delivery pathways results in a lack of necessary control and design principles that would help to avoid capture of policy program mechanisms for private rather than public benefit. In particular, the use of the complex Regulatory-Intermediary-Target (RIT) model results in a high failure potential due to the need to control multiple simultaneous governance structures.





**There is no evidence to support the centrality of irrigation infrastructure as a core, or even a minor, pathway for the northern development program to achieve program objectives.**

Irrigation infrastructure investments are unlikely to be the best use of public funds or allocation of public resources such as water and land for achieving northern development outcomes. In fact, irrigation developments in the north may generate major negative, and permanent, impacts on natural water assets in northern Australia.

Additionally, there is evidence of persistent over-estimation of the public and private benefits of investments – something that is strongly indicative of an ‘optimism bias’ in project proposal and selection processes, with very little transparency despite clear statements in the White Paper related to the importance of review and robust benefit cost analysis.

There is also evidence of inadequacies in:

- Governance mechanisms, including the independence of project assessors from project proponents and clarity and transparency in proposal assessment processes;
- Accounting for potential negative cultural, environmental and social impacts;
- Targeting of stated objectives of funding, particularly regarding marginalised communities in northern Australia;
- Engagement of Aboriginal Australians in the development of pathways within the Northern Development Program and in design and selection of proposed water investment projects.

As the White Paper claims, the north needs investment. However, the investments selected under the auspices of the NDP undermine the true potential of the north. Current NDP projects are likely to have perverse outcomes through damaging current and future prospects of people living in the north by placing key natural assets at risk. There is an urgent need to reconsider the NDP and to implement policies that can generate benefits for northern communities in ways that support their own objectives, and that can do so in a way that truly builds on the unique natural, cultural, and social assets of 'the north'.

**It is time to end the 'northern mirage' and replace it with an evidence-based development strategy.**

## KEY RECOMMENDATIONS

This report has two key recommendations.

1. **The Australian Government's proposed refresh of 'Our North, Our Future' White Paper should extend to a comprehensive review of the Northern Development Program,** including key funding mechanisms such as the Northern Australia Infrastructure Fund (NAIF) and National Water Infrastructure Development Fund (NWIDF), with a focus on:
  - a. Valuing and maintaining assets (natural, social, cultural, physical, and human) that support current wellbeing in northern Australia;
  - b. Ensuring evidence based development and program pathways;
  - c. Consultation with northern Australian communities, in particular with Indigenous Australians;
2. For all future project assessments, implement a formal and mandatory review process designed to address optimism bias in irrigation projects. These processes should:
  - a. Use proven frameworks, such as the Reference Case Analysis framework as a basis for project benefit review and create independent review mechanisms to avoid regulatory capture of the funding agency;
  - b. Ensure transparency measures are implemented to enable public scrutiny and independent review of investments.





# 1 REPORT OVERVIEW



This report aims to provide a critique of the effectiveness of the Northern Development Program (NDP) and the principles that motivate it and have motivated northern development policy for decades.

## 1.1 OBJECTIVES

The report reviews expected performance of NDP logic and water resource investments against stated program targets and beneficiaries.

To achieve this, we first established clarity over core characteristics of the NDP's rationale, premises, assumptions, chosen program and policy mechanisms, target impact pathways along with their expected outcomes, and the relevance of natural water assets.

This included identifying the role of natural water assets as irrigation resources and how this relates to achieving sustainable development goals, addressing targets under Closing The Gap, and other stated program objectives.

This report assesses whether the NDP can be considered as meeting basic expectations for public investment and public policy using its own stated criteria as a basis for assessment.

## 1.2 REVIEW QUESTIONS

Research for this report was guided by the following set of questions on NDP program design and policy settings, high level stated objectives, and comparison of performance against stated objectives.

### QUESTIONS ON NDP STATED OBJECTIVES

1. What is the rationale for the NDP?
  - a. Who are the claimed target beneficiaries?
  - b. What is the claimed pathway to achievement of outcomes for target beneficiaries?
  - c. What is the role of water asset development in the NDP?
  - d. What other assumptions underpin the NDP?

### QUESTIONS PERFORMANCE AND PATHWAYS TO SUCCESS OR FAILURE

1. What information is available from previous research on the NDP?
  - a. What concerns have been raised regarding claimed beneficiaries, impact pathways, and other assumptions?
  - b. Has water asset development been substantially reviewed (for public consumption)?



2. How do proposed (and funded) projects perform on the basis of:
  - a. Investment costs and timeframes?
  - b. Returns on investments?
  - c. Employment outcomes?
  - d. Outcomes for target beneficiaries?
3. Are there patterns in the performance of proposed projects that reflect on the underlying assumptions of projects?
  - a. How do assumptions appear to be consistently different (or similar) to stated outcomes?
  - b. How do persistent differences reflect on basic impact pathway assumptions and beneficiary assumptions?
  - c. How might the governance of water asset development programs be affecting outcomes?

## 1.3 METHODOLOGY OF THIS REPORT

For the first aim – clarifying the rationale, target outcomes and beneficiaries, assumed impact pathway, and chosen policy mechanisms – we used document review and content analysis methods. These involved close reading of core documents underpinning the NDP in order to derive a clear description of core program assumptions, expectations, and mechanisms.

The second aim – assessment of performance against stated objectives – involved the application of reference case analysis. This approach has been widely used in infrastructure investment programs to generate a robust basis for establishing whether expected project outcomes are reasonable (Flyvbjerg 2008). It is widely regarded as a robust approach to assessing potential optimism bias, a bias that appears almost ubiquitous in project investment statements, particularly when those statements involve seeking funding from third parties like government. A range of reference case studies from throughout northern Australia was compiled and compared to stated expectations of project outcomes for water resource projects considered for funding under the NDP.

### 1.3.1 DEFINING KEY OBJECTIVES, BENEFICIARIES, ASSUMPTIONS, AND CHOSEN IMPACT PATHWAYS OF THE NDP

Despite being a substantial document, and having many associated documents for linked programs, the NDP does not explicitly outline basic project characteristics such as a project overall objective, target beneficiaries, detail on project and policy mechanisms, or governance, impact pathways, or assumptions. Yet there is substantial description throughout the NDP that allows relatively precise inferences to be made on these aspects.

The content analysis of the NDP was undertaken to allow for a clear articulation of these aspects to analyse the performance of this policy program against its own objectives, while also considering the modern relevance of those objectives.

Content analysis involved identifying key statements made in the NDP as describing these and other aspects. Throughout the content analysis subjective analysis is minimised with the use of direct quotations and clear references to components of the NDP being the basis of defining objectives, target beneficiaries, detail on project and policy mechanisms and on governance, impact pathways, or assumptions.

## 1.3.2 PERFORMANCE OF CHOSEN, AND PROPOSED, PROJECTS AND IMPACT PATHWAYS

Large public investment projects in Australia are reasonably expected to be subjected to considerable scrutiny, to be based on the best possible knowledge, and to represent the best-known options available to achieve target outcomes. The basic premise of such investments is that they are subject to independent and robust analysis of the respective costs and benefits as compared against the next best available alternative and that they are found to be the best use of public resources on these bases.

The Australian Government has recognised the potential for project failure associated with the overstatement of benefits, explicitly describing the important role of benefit-cost analysis undertaken independently of a project proponent in providing a robust description of actual expected social and economic benefits:

*It can be difficult for governments to determine which projects are most valued because users may overstate their benefits if they do not have to pay for them. Cost benefit analysis is an important tool for governments to evaluate projects and determine spending priorities*

*(White Paper, p8)*

Reference case analysis (or reference class forecasting) is a well-accepted and adopted methodology for estimating costs and benefit outcomes in infrastructure planning and business cases based on previously observed outcomes.

Reference case analysis seeks to compare estimates of costs and benefits against the actual performance in a reference class of comparable actions (Flyvbjerg, 2008). Reference case analysis stems from Nobel prize winning work by Kahneman and Tversky (1979), who showed that decision makers systematically underestimate the costs, completion times, and risks of projects, and that the benefits of these same projects were consistently overestimated. Specifically, reference case analysis was identified as a mechanism to identify, and rectify, 'optimism bias': the tendency of decision makers to be over-optimistic by overestimating benefits, underestimating costs, and disregarding potential risks (Lovallo and Kahneman, 2003).

Reference case analysis has been endorsed by the Productivity Commission (2014) and the Department of Infrastructure and Regional Development (2017). Typically, reference case analysis focusses on capital and operating costs, as there is greater concern over cost uncertainty from funders and relatively more past projects in which relevant cost information can be used as reference cases. For example, Petheram and McMahon (2019) reviewed 98 major dam projects in Australia using reference case analysis to identify cost overruns between proposed and actual capital and operating costs.

Further details of this methodology are provided in Section 4 (Methodology).

## 1.4 OVERVIEW OF FINDINGS

### 1.4.1 CONTENT ANALYSIS TO DEFINE BASIC POLICY CHARACTERISTICS

The analysis of the white paper allowed a clear articulation of overall goals, target beneficiaries, assumed impact pathways, policy mechanisms, and control/assurance approaches.



We summarise the objectives of the NDP, with a focus on the Northern Territory, as being:

*Achievement of major improvements in livelihoods, social cohesion, and economic participation for all Territorians but more so for those Territorians who have experienced long-standing disadvantage. Further, these improvements should occur alongside a maintenance or improvement in environmental sustainability, cultural ties to land for Aboriginal Territorians, and improved recreational, amenity, and non-use values for the unique environmental assets of the Northern Territory.*

This objective statement is based on analysis of a large number of statements in the White Paper itself and in a range of other documents that underpin programs either used by the White Paper as a rationale (e.g. Closing The Gap) or that are directly linked to the White Paper or economic and social development objectives in the Northern Territory. This statement is developed from content analysis of the White Paper and associated documents.

Specific aspects of the NDP are summarised on the following page.





## TARGET BENEFICIARIES

Target beneficiaries of the NDP – in the context of the Northern Territory – are primarily all residents, with a stronger relative focus on rural communities and Aboriginal Territorians along with a range of other stakeholder groups including agricultural business owners, recreational fishers, tourism operators and tourists.



## TARGET OUTCOMES

The target outcomes for the NDP overall are not stated explicitly nor quantitatively but rather as general positive outcomes for target beneficiaries. These are largely aligned around economic benefits including increased employment, value of exports from the north, community cohesion and welfare and increased economic growth. In addition, the White Paper makes clear statements about focusing these benefits on disadvantaged groups including rural communities and Aboriginal Territorians, and on ensuring that development is undertaken in a way that maintains or improves important natural assets.



## IMPACT PATHWAYS

The impact pathway with respect to natural water assets is strongly focused on investment in water infrastructure – including dams, ground water extraction mechanisms and overland flow harvesting infrastructure – to support irrigation for agriculture. Natural water assets themselves are regarded as central assets to support the NDP with substantial resourcing dedicated to them along with a considerable focus on their role in supporting the NDP. Agricultural businesses are viewed as being the main mechanism through which investments in natural water assets as irrigation resources are transformed into economic and social benefits to target beneficiaries. Critically, these impact pathways are assumed in the NDP and are not based on accepted current science on rural and regional development.



## POLICY DESIGN/MECHANISM

Policy mechanisms to achieve target outcomes for target beneficiaries make use of a 'Regulator-Intermediary-Target' (RIT) model. The RIT model is a generalisation of traditional direct-intervention models. In traditional models the regulator/government seeks to directly influence outcomes for target beneficiaries/agents. In the RIT model, regulator actions are restricted to acting on intermediaries – other agents that are not target beneficiaries – who then change behaviour resulting in benefit/influence flows to the target cohort. It is clear that the RIT model applies directly to the focus on agricultural businesses in supporting economic development through exports of high-value agricultural produce, employment through normal business operations, and social/welfare improvements through employment and investment benefits being assumed to accrue in rural communities. The RIT distributed model of governance is more complex than direct-influence models, a factor that underpins both its flexibility and power and the potential issues that can arise in its application.

There is a lack of consideration or even awareness of governance needs for the chosen policy pathway. This lack of concern is highlighted by both a lack of sufficient justification for expenditure allocations/decisions and a lack of monitoring effort compounded by an avoidance of independent analysis of expected project returns and risks prior to investment decisions being made.



## PROJECT ASSESSMENT

The NDP explicitly states a focus on standard project assessment criteria for large public investment projects, including ensuring that all relevant alternatives will be considered in order to ensure the 'best' investment pathways are selected to achieve program objectives, as exemplified in the following statements from the White Paper:

*Support for new water infrastructure should not be prescriptive. It should match the best available supply options with demand to ensure ongoing economic viability. It is important for consideration of investments in new dams to be underpinned by robust economic analysis to ensure returns are commensurate with the level of investment.*

*Regarding investments in water infrastructure ... the investment should provide the highest net benefit of all options available to increase access to water, taking into account economic, social and environmental impacts.*



## 1.4.2 REVIEW OF PERFORMANCE

Across all key measures assessed in the NDP reference class analysis, there is a persistent difference between the stated expectations of projects and their eventual outcomes that, in all cases, made the project appear better than it really was. For the project proposals assessed:

- Irrigation proposals have typically assumed best case scenarios for construction timelines (1-3 years) and the scaling of irrigation operations (1-8 years). This is despite recent irrigation developments such as Paradise Dam scaling more slowly over a 10-to 30-year horizon as water markets mature and uncertainty on water availability is resolved.
- Proposals assume crop mixes that include an unrealistically high proportion of high-value crops such as perennial trees. Returns and profits from the assumed crop mixes also tend to be overstated to what is typically observed, with gross margins assuming best case scenarios for prices, yields and costs across all years within the investment timelines.
- On-farm costs for establishing irrigation districts are assumed to be within \$10,000-\$15,000 per hectare, although it is generally accepted that on-farm development costs for new greenfield sites that require upfront land preparation can be upwards of \$40,000 per ha when considering all supporting infrastructure.

Employment outcomes from irrigation projects are substantially overstated due to incorrect models to estimate new jobs, and the failure to recognise the reliance on distant labour forces. Employment for new irrigation projects is typically filled by workers who would have otherwise been employed elsewhere, with the majority of this workforce being filled by interstate or overseas workers while providing limited employment for regional or remote communities.

## 1.4.3 ADDITIONAL FINDINGS

There is evidence that the major assumed impact pathways, particularly that involving investment in water resource infrastructure for irrigation development, have been selected without any consideration of current science/best-practice policy approaches for regional development. This is despite repeated statements that the NDP is predicated on 'good governance' approaches, such as considering all possible pathways to achieve target impacts in the most efficient way possible.

There is little evidence that project pathways chosen for consideration have been selected on the basis of achieving target outcomes for target beneficiaries. This finding contradicts statements that the NDP is a program that seeks to generate benefits for the people living in northern Australia, for Aboriginal Australians, and for the wider community.

There is evidence of misdirection in overall funding priorities in the NDP that is likely to involve substantial outlays of public money and/or allocations of public resources for little overall economic benefit and likely substantial environmental cost. This comes despite repeated statements that the NDP is a program designed to support sustainable economic development. Some of this misdirection appears to be due to a focus on policy pathways and investments, rather than program outcomes, as measures of performance.

There is little evidence of meaningful engagement with people living in rural NT communities – including Indigenous people – that could help guide investment decisions to support culturally and environmentally sensitive development options with the greatest benefit to people living in the north. This finding contradicts statements that the NDP is a program that supports integration of Aboriginal Australians' concerns and seeks to integrate community views into decision making.

Target beneficiaries of the NDP appear to stand to gain little from the investments being made under the auspices of this program, and may even face major and costly changes to their livelihoods, lifestyles, and cultural values through major public investment programs such as the National Water Infrastructure Development Fund (NWIDF).

There exists a strong distinction between the published stated aims of the NDP, and the actual development of programs associated with the NDP. The White Paper contains repeated statements regarding inclusion of the concerns of people living in northern Australia, of Indigenous Australians, of environmental sustainability and preservation of the unique and highly sensitive wilderness of northern Australia. Yet there is no evidence of governance processes to support these statements in a substantive way, nor is there evidence to suggest that the chosen investment pathway, mainly associated with irrigation development of otherwise natural waterways, can support any of the objectives stated in the White Paper and other supporting policy documents.

**Our findings also show that a core program impact pathway, natural water resource development, has limited positive relationship to program rationale statements (target outcomes and target beneficiaries) and, further, is unlikely to achieve basic break-even financial returns based on regional economic impacts.**

The latter is a clearly stated objective in not only the White Paper but also in documents describing the NWIDF and NAIF.

The lack of evidence for chosen impact statements combined with their repeated statement as core development mechanisms in the NDP is strongly indicative that the NDP is not based on science and best-practice approaches to regional development. Rather, the White Paper uses narrative to paint a mirage of northern development that continues historical support for a pre-assumed outcome of irrigation led development.

The objectives of the NDP, as derived from the content analysis, are commendable even if they (and many other core project/policy characteristics) are not stated explicitly. However, these derived objectives are misleading about the actual actions and pathways chosen by/for the NDP with evidence from this review indicative that these objectives are not achievable with the pathways chosen. It is unable to be determined in this review if this mismatch is due to purposeful misdirection by the writers of the White Paper or due to failure in policy planning processes.





## 1.4.4 CONCLUSIONS

The main findings from this review are clear. Supported by data and the analysis undertaken here to an extent that is rare in the world of critical project review, these findings are:

1. The stated **objectives from northern development are derived from concerns of non-resident populations and continue to fail to consider the needs and objectives of residents;**
2. Even if the objectives were appropriate for the population of northern Australia, the assumptions that chosen pathways can achieve those goals are incorrect because even if projects were implemented successfully, they would not achieve their stated objectives;
3. There is a **persistent and large optimism bias** that has led to excessive government support relative to expected benefits. This includes allocating rights to natural assets - which support a wide range of economic, social and cultural values - to privately-operated projects that will never achieve target returns, let alone stated development objectives.
4. The focus on an intermediary-based delivery mechanism for project impacts means that **target beneficiaries (as described in key high level policy documents) are likely to derive minimal benefit from most if not all proposed NPD style investments and policies.** Meanwhile, intermediaries used to deliver program benefits (i.e. large agricultural enterprises) are likely to gain most benefit with little evidence to suggest that those benefits flow back to target beneficiaries.

These four conclusions are strongly indicative of a persistent failure in policy settings and the rationale that underpins the NDP.

In addition, despite motherhood statements outlining the importance of governance in the use of water assets (White Paper, p3), there remain major concerns around water allocations and overall water policy choices, particularly in the Northern Territory. These concerns may severely undermine even the limited potential of the existing program to achieve positive outcomes for target beneficiaries in northern Australia.

**Overall, we find the existing approach to water asset development in northern Australia to be deeply and structurally flawed,** with a strong likelihood that existing approval processes for water asset development will lead to major environmental impacts with little or no benefit for target beneficiaries - while costing taxpayers hundreds of millions of dollars. The findings show that there are major concerns around basic policy principles in NDP logic backed Commonwealth, NT and other state policies that seek to weigh alternative courses of action (only one was considered), value for money, equity, and sustainability. Our findings indicate that the NDP is, in reality, based on a continuation of the 'northern mirage' mantra.

Opposite Page: Ord River Diversion Dam under construction in 1962. Credit: Arthur & Dorothy Perry



## 2 A SHORT HISTORY OF 'DEVELOP THE NORTH' PROGRAMS



The ongoing history of attempts to develop northern Australia's water and land assets has received a substantial amount of attention in the literature. Many have challenged the notion that the region's water assets are untapped and wasted, arguing instead, that they provide significant environmental, social, and cultural values for people living in the north.

For these residents, unregulated, healthy rivers provide significant use and non-use value and represent a major part of northern Australian cultural identity (Jackson *et al.* 2008). Far from being *wasted*, these rivers provide widespread benefits. They sustain the largest and most intact savanna ecosystems in the world (Garnett *et al.* 2008); they are the foundation for a unique recreational and commercial fishing industry based on prized tropical species such as Barramundi and Mangrove Jack; and they enable direct maintenance of cultural ties to the land for First Nations peoples in the north.

Large infrastructure projects, which seek to disrupt flows of these rivers for economic benefits, often disregard the cultural values associated with rivers and have irreversibly damaged these values for people experiencing the north (Head 1999, Jackson *et al.* 2016).

In the book, *Northern Dreams: The Politics of Northern Development in Australia*, Lyndon Megarrity (2018) outlines a recurring interest in *northern development* with blunt assumptions and interests perpetuating a view that the north is neglected and underdeveloped. The vision is invariably of an untapped, insecure, and/or wasted north, the potential of which can be realised through southern-led investment in physical infrastructure and business acumen, supported by government. Central to this vision is the perception of abundant water assets that are currently squandered and that, instead, natural water assets should be allocated and developed for irrigated production and export to high-value markets in Asia and beyond (Head 1999).

The argument that government investment in water infrastructure can *solve* the development problem has been repeatedly challenged. As early as 1965, agricultural economist, B.R. Davidson, in his book *the Northern Myth (1965)*, outlines how overly optimistic predictions of the development potential of northern Australian natural assets has resulted in several significant failures of large-scale irrigation and agriculture investments. Reasons for this include a lack of understanding of water supply and variability, as well as numerous operational and environmental factors that result in stark contrasts between expectations and reality.

More recent hydrological studies show that the flow of many of the northern Australian rivers is largely event-driven, providing limited opportunities to store and harvest river flows for irrigated development (Petheram *et al.* 2008, Petheram *et al.* 2018).



Furthermore, ecosystem processes and population dynamics within northern rivers are heavily reliant on strongly differentiated wet/dry seasonality (Warfe *et al.* 2011). While these same studies argue that irrigated production is technically feasible in some sites, socio-economic factors will constrain the economic viability of these projects as with those before them. Studies by the CSIRO (Ash *et al.* 2017, Stokes *et al.* 2018) investigating the feasibility of irrigation development argue that, based off similar projects in northern Australia, positive returns from agriculture requires an unsustainable mix of continuous, high-value cropping.

In their review of irrigation projects in northern Australia, Ash and Watson (2018) found that many of these agricultural irrigation projects underperformed relative to expectations. They pointed to a strong likelihood that unattenuated over-optimism with respect to management and financial factors acted as a driver for project funding and investment. There were also concerns that these constraints would be compounded by the effects of climate change on northern Australian weather patterns (Ash and Watson 2018).

Interest in developing northern Australian natural assets has again peaked in recent years, culminating in the White Paper on developing Northern Australia (2015). This interest is associated with proposals for the Ord River Expansion Stage 3 (Department of Primary Industries and Regional Development Western Australia 2022), recent applications to extract water from the Roper River (Fitzgerald 2022), and the granting of 40,000 ML of groundwater for irrigated agriculture in Western Davenport (Department of Environment, Parks and Water Security Northern Territory 2021).

It is also associated with policy undertakings to support broad scale agriculture such as recent draft policies for surface water harvesting in the Northern Territory and consideration of a large water allocations from the Martuwarra Fitzroy River in Western Australia.

For these new irrigation developments, there is a clear imperative to learn from past failings and recognise the complexity of water values and water management objectives for northern Australian rivers and other natural water assets. The White Paper acknowledges historical failures, as outlined by a range of authors reviewed in this report, and claims that this time is different:

*Many previous efforts to develop the north have floundered through a lack of foresight and the absence of markets in our region for high value goods and services. Through this, the first ever White Paper on Developing Northern Australia (the White Paper), the Commonwealth Government is putting in place the right policies, at the right time, to unlock the north's vast potential. This White Paper has been developed to stand the test of time – it should be the first, and last, White Paper for the north. (p1)*

Given the repeated failures of northern development programs in Australia, achieving a different outcome from these historical failures will clearly require a different approach, and not just statements regarding *difference*. Whether the NDP can be truly seen as differing from previous programs is a simple indicator of potential success, or at least avoidance of major failure, of the NDP.

Opposite Page: Crops under irrigation at Kununurra on the Ord river Western Australia; Credit: Alamy





### **3 CURRENT POLICY & VALUE PERSPECTIVES IN WATER ASSET DEVELOPMENT**



Understanding the orientation, the explicit or implicit objectives, the impact pathways used to achieve objectives, and policy design and governance considerations is a first step in reviewing the NDP. Yet the NDP is a loosely defined set of programs that are derived, seemingly largely, from the White Paper on Northern Development. Associated with the NDP are a range of nationally funded policy programs that seek to support the NDP aims, in addition to a range of state and territory policies.

For example, the \$500 million National Water Infrastructure Development Fund (NWIDF) is strongly associated with the White Paper and speaks to water infrastructure as being a core pathway sought within the NDP to achieve regional economic development whilst ensuring environmental protection:

*The National Water Infrastructure Development Fund core objective:  
To start the detailed planning and to build or augment existing water infrastructure, including dams, pipelines or managed aquifer recharge. This will help secure the nation's water supplies and deliver regional economic development benefits for Australia, whilst also protecting the environment.*

The bulk of funding for the NWIDF (\$440m AUD) has been allocated to infrastructure development in northern Australia, with a maximum of 50% of infrastructure costs being supported by the NWIDF for any given project. The remaining budget has been allocated to early scoping and feasibility assessments of infrastructure proposals. The focus on infrastructure expansion to support northern development objectives by the NWIDF, the White Paper and associated Northern Australia Infrastructure Development Fund is indicative of a strong bias toward investment in large water infrastructure as a core development pathway for northern Australia.

The Northern Territory Government, too, has indicated a preference for infrastructure development that appears to largely align with that outlined in the White Paper, with major irrigation programs and approvals across the Northern Territory. These include proposals for the development of floodplain water harvesting and, more recently, a controversial water licence allocation that is the largest in the Northern Territory at 40 gigalitres (Connor *et al* 2022).

Whilst there is clearly an infrastructure focus in water asset development for northern Australia, and specifically in the Northern Territory for this review, there is also a range of other development perspectives stated in policy documents that can be considered as indicative of the underlying objectives for the NDP. Describing these objectives is critical to understanding the performance of water asset development programs in the Northern Territory and particularly in understanding whether the implied impact pathway of water asset development and extraction can actually meet the objectives of development and public aspirations.

In the following sub-sections, we take a high-level view of Commonwealth and Northern Territory policy perspectives on:

1. The NDP impact process and associated concepts;
2. The objectives and target beneficiaries of water asset development in the Northern Territory as a core mechanism of the NDP, and;
3. The assumed pathway to impact for water asset infrastructure investment that is explicit or implicit in the set of policy documents describing policies and programs supporting the NDP.



## 3.1 POLICY OBJECTIVES AND PROGRAM IMPACT PATHWAYS CONCEPTS

Understanding policy perspectives and the proposed or assumed impact pathway for a policy program is critical to undertaking effective evaluation and to effective and efficient design of the policy program in the first place. In many recent cases, policy programs in Australia set out an impact pathway that involves considerable use of intermediaries to support target objectives.

### THE REGULATOR-INTERMEDIARY-TARGET (RIT) MODEL

The RIT is a model of governance and/or program operation that involves the traditional actors of a 'regulator' (or 'influencer' or 'principal') and a 'target' (or 'beneficiary' or 'agent') but also involves an 'intermediary'. This latter actor in the RIT represents substantial innovation in policy/program development in recent years that seeks to place government operations 'at arms length' by utilising intermediary organisations or actors to undertake the core activities associated with generating outcomes for target actors/beneficiaries.

These approaches are potentially powerful, allowing for substantially enhanced flexibility and leverage in government programs. But they are also far more complex than traditional regulator-target (or government-beneficiary) models for policy programs. Perhaps most importantly, RIT policy programs rely on alignment of the incentives of intermediaries with the objectives of the policy program through influence (incentives), coercion (regulation), or perhaps even through natural outcomes of the institutional environment (highly unlikely given the need for government intervention). These aspects also likely mean substantially greater oversight is needed than normal, a pattern that generally does not appear to have emerged naturally as RIT models for policy programs have grown (Abbott *et al.* 2017).

The White Paper, for example, is clear on viewing the NDP as a Regulator-Intermediary-Target (RIT) model<sup>1</sup>, stating:

*Governments' role is to create successful business environments, not successful businesses. This is best achieved through prudent economic policies, the right infrastructure to get things moving, regulation that minimises costs on business, a workforce with the right skills, and basic research necessary for business to identify opportunities in the north.*

[White Paper p2]

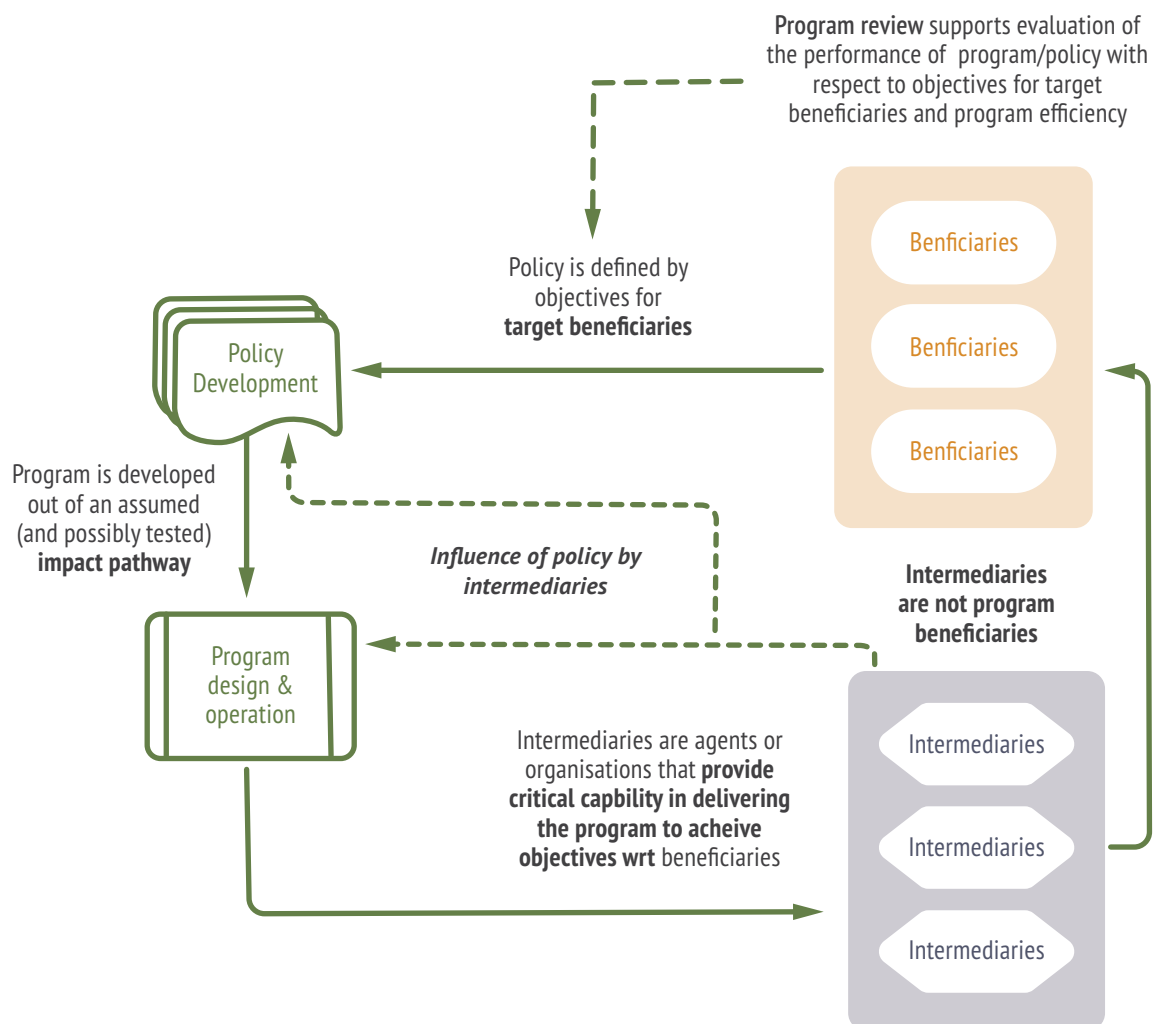
---

<sup>1</sup>See Abbott *et al.* 2017 for a review of RIT theory and concepts. The associated special issue of that journal also includes a range of applications of the RIT concept to actual policy programs that provide for deeper insights on how widely this approach is used in addition to its strengths and weaknesses as an approach to policy design and program operation.

The use of intermediaries as critical pathways is nothing new for the succession of programs seeking to *develop the north*. In all historical cases, the *develop the north* program has had a strong focus on the use of intermediaries – businesses, populations, and other agents – to support achievement of policy objectives. This form of distributed governance is reflected in more recently developed theories of governance and program development that explicitly deal with the interactions between a policy maker (a regulator), target beneficiaries (the targets), and intermediaries: The Regulator-Intermediary-Target (RIT) model of governance (Abbott *et al.* 2017) has been widely used, both generating positive outcomes and major failures. For example, food safety governance employs an intermediary-based model in many areas that effectively operates as a private-sector program generating substantial trust in food safety at low cost (e.g., the GLOBALG.A.P. retailer assurance program – McNaughton and Lockie 2017).

### FIGURE 1:

A CONCEPTUAL DEPICTION OF THE DISTINCTION BETWEEN PROGRAM INTERMEDIARIES, PROGRAM BENEFICIARIES AND THE POLICY AND PROGRAM RELATION TO THE IMPACT PATHWAY





On the other hand, the Global Financial Crisis (GFC) was associated with major concerns around the operation of Credit Ratings Agencies (CRAs). CRAs operate as intermediaries but were shown prior to the GFC to have captured the regulator, becoming de-factor regulators. They had little incentive to operate as originally intended and substantial incentives to leverage a powerful position as the assessors and communicators of critical reputational features of the financial industry (i.e., credit worthiness) (Kruck 2017).

These features, alone, though are not necessarily sufficient to cause failure of a RIT-based policy. Rather, failure in RIT cases arises from the failure to properly align incentives of intermediaries with program objectives.

Figure 1 presents a conceptual depiction of the interaction between beneficiaries (target groups), policy development, the centrality of the impact pathway to program development, and the role of intermediaries as non-government groups/agents that support delivery of the program.

A number of distinctions provide clarity when describing the objectives of a policy, the impact pathway that is assumed by a policy and sought to be achieved through program operation, and the role of intermediaries as opposed to beneficiaries. These are:

AGENTS IN THE RIT MODEL
<b>Beneficiaries:</b> The target beneficiaries of a policy and policy program are the people, concerns and groups that the policy has been developed to benefit or moderate. Objectives are normally defined in terms of beneficiaries <sup>2</sup> .
<b>Intermediaries:</b> Agents/organisations that are used to support the program in achievement of its objectives. These can be entities that are created for the specific purposes of a policy program or that pre-date the policy program and are co-opted into its operations through enticements or regulations.
<b>Regulator:</b> The originator of the policy and policy program.

OPERATIONS IN THE RIT MODEL
<b>Impact pathway:</b> The assumed pathway from policy program actions to policy impacts on target beneficiaries.
<b>Operation:</b> The operation of the policy program including procedures and targeted actions of intermediaries and beneficiaries.
<b>RInfluence:</b> Informal or non-target pathways of influence that can change how a program operates over time.

---

<sup>2</sup> Note that not all policies have 'beneficiaries' in a direct sense but rather focus on a general achievement that supports a range of policy objectives such as economic efficiency, national security, etc. In the case of the 'develop the north' programs over the last century, original objectives were to secure the north against invasion whilst in more recent times objectives have been defined in terms of more typical economic development objectives with target beneficiaries.

## KEY INSIGHTS FROM THE REVIEW AND PRESENTATION OF FIGURE 1 ARE:

1. **Beneficiaries are central** to policy formation and provide the rationale for a policy program and the basis on which core outcomes of the program are evaluated (i.e., the *effectiveness* of the program).
2. **Intermediaries are not typically beneficiaries**, although they may be *targets* of policies seeking to use them as impact pathways.
3. **Intermediaries can exert undue influence** on policy settings and program operations in order to extract more benefits for themselves or to, in-turn, co-opt the program to redirect benefits to themselves.
4. **Program evaluation is a critical component** that can describe program *effectiveness* (if and to what extent it achieves its objectives) and *efficiency* (how well it does so given assets allocated to it) as well as the reasons why effectiveness and/or efficiency may be lower than expected.

Recent reviews of the RIT model indicate that it is a powerful approach for policy programs, providing for the leveraging of extensive capability outside of that embodied by government or any other regulator. It is, however, more complex than direct intervention approaches and involves a reliance on a more convoluted pathway to impact that embodies potentially competing interests and the potential for capture of policy design activities and/or program operational mechanisms. The evidence around the RIT approach to policy programs suggests there should be caution in its application, particularly when there are many uncertainties around impact pathways (see the range of articles in the special issue of *American Academy of Political and Social Science* introduced by Abbott *et al.* 2017). It may also be that, in many cases, policy makers are unaware of the implications of the use of intermediaries as opposed to the application of traditional two-party models of influence (i.e., regulator-target or principal-agent models).

A salient example of the risks of intermediary-based policy programs is the case of credit ratings agencies (CRAs) which were originally designed to regulate banks' risk-taking behaviour, but which, through poor design of this RIT-based policy, ended up substantially contributing to the Global Financial Crisis (Kruck 2017).

**In general, these types of risks emerge from the incentives of intermediaries being poorly aligned with program objectives combined with a failure of the policy program to realign those incentives and/or to ensure compliance through monitoring and enforcement. The basic outcome of program failure in the RIT case is the co-opting of the policy program by intermediaries for their own benefit (Abbott *et al.* 2017).**

The incentives and potential for intermediaries to take advantage of RIT-type policy programs appear almost ubiquitous. Fortunately, these risks are not insurmountable, provided that policy programs adopt careful design principles to take them into account (see the special issue introduced by Abbott *et al.* 2017). How intermediary-based policy programs are designed for use as development tools is thus likely to be critical to the effective and efficient operation of the contemporary NDP.



Above: Sun setting on a farm in the NT; Credit: Alamy

## 3.2 INTERMEDIARIES VS BENEFICIARIES

Intermediaries can be distinguished from beneficiaries by considering their role in the policy/program model shown in Figure 1 - specifically, through consideration of whether a particular group/agent is an endpoint for impact flows for core policy objectives.

Confusion over which groups are beneficiaries and which are intermediaries may arise when policies are derived from poorly defined over-arching policy rationales, targets, settings or program operations. There is a contrast between a simple direct non-intermediary-based program, such as farm drought relief, and more complex intermediary-based programs, such as enhancing rural community viability through maintaining irrigation water for use by agricultural enterprises in the Murray Darling Basin. This contrast provides an example of how targets can be beneficiaries in the direct case, but both intermediaries and targets in the indirect policy program case.

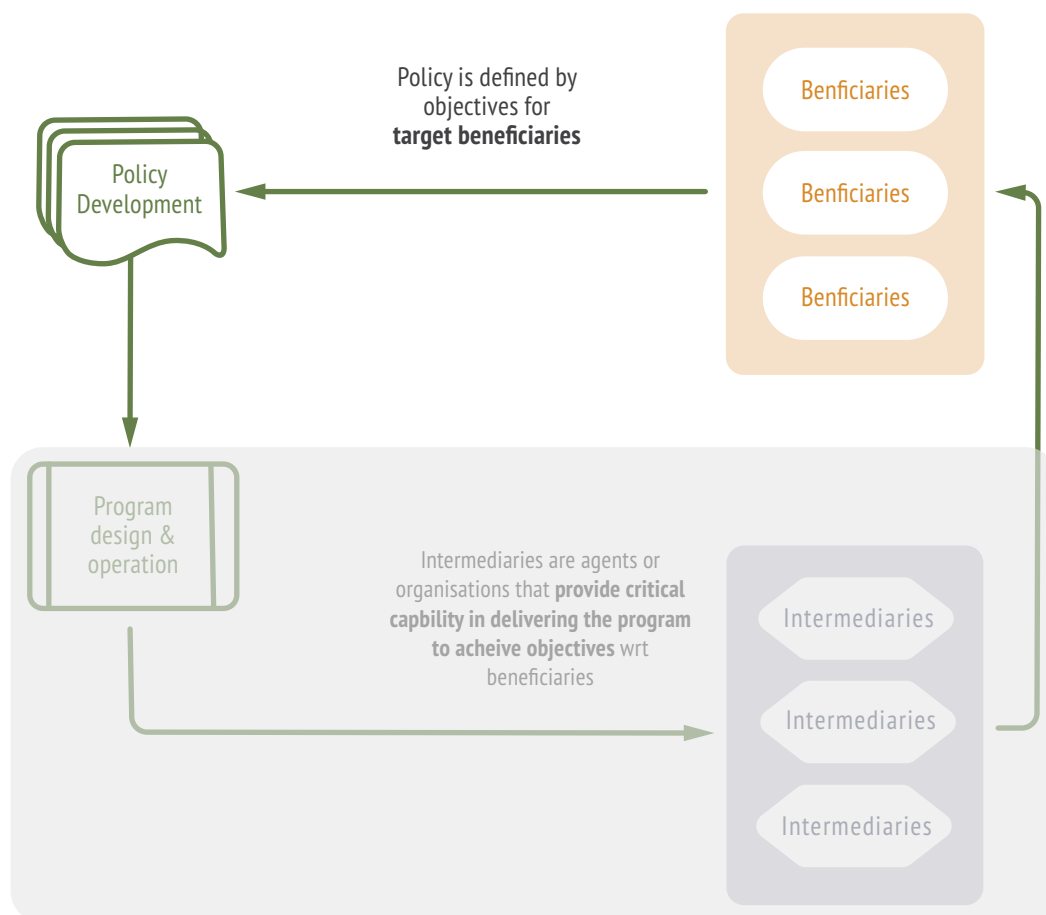
In the first case, of farm business drought relief policies, the overarching goal is to maintain the capability, viability, and competitiveness of Australian agricultural industries in the face of serious and unexpected (*exceptional*) dry periods. In this case, farm businesses can be considered as endpoints of the policy because the target of the program is their viability as supporters of Australian agricultural industries<sup>3</sup>.

---

<sup>3</sup> Note, more recently farm drought support programs have shifted to RIT approaches with the introduction of major funding under the auspices of the Future Drought Fund. These approaches seek to support innovations/approaches that better allow farms to prepare for, adapt to, and manage drought conditions.



**FIGURE 2:**  
**BENEFICIARIES IN AN INTERMEDIARY-DRIVEN POLICY-PROGRAM FRAMEWORK**



In the second case, farm businesses can be targets of policies but only as intermediaries – such as the range of policies seeking retention of water for irrigation purposes in the Murray Darling Basin rivers system. In the latter case, review of policy documents indicates that the target beneficiaries are rural communities and their constituents; specifically, seeking to maintain social cohesion, economic viability, and mental wellbeing in rural communities. Thus, even though farm businesses are targets of programs supporting retention of irrigation water for agriculture, they are actually intermediaries. Farm businesses in this case are not an endpoint for the policy impact pathway.

So it is with the NDP: an indirect policy program that seeks to achieve socio-economic objectives via the facilitation of agricultural and other natural, asset-based business activities. Under the broad set of policy principles and guidelines that describe intentions and objectives around northern development, as reviewed below, agricultural enterprises and other commercial operations are clearly and explicitly seen as targets of the NDP but are targeted to act as intermediaries in the impact pathway. Through business operations enabled or enhanced by the NDP, the set of policies assume that these activities will generate positive outcomes for target beneficiaries.

## 3.3 DEFINING BENEFICIARIES

In this section, we provide a description of target beneficiaries, and target outcomes for those beneficiaries associated with the NDP. The aim of this section is to clarify that government investment and development programs do not exist in isolation but for specific reasons that target specific beneficiaries – whether those are all Australians or a specific cohort. Beneficiaries are critical for informing policy development and focus – they provide the overriding rationale for program design and operation as shown in Figure 2.

Key programs that seek to underpin the accepted logic regarding the use of northern water assets to facilitate the achievement of the NDP state an over-arching focus on populations at the national and territory level, as well as for Aboriginal Territorians. The Northern Australian Infrastructure Facility (NAIF) is one typical example, embodying the focus of the White Paper, with objectives of<sup>4</sup>:

- Generating public benefit, including benefits beyond those captured by the project proponent;
- Encouraging longer-term growth in the economy and population of northern Australia; and
- Facilitating sustainable participation of Aboriginal Australians in procurement and employment outcomes.

**These and other programs operated by the Australian Government target benefits to the general Australian public but specifically state that populations in northern Australia and Aboriginal Australians should be key beneficiaries of investment and policy programs.**

In the remainder of this section, we review specific statements that outline benefits to these particular cohorts: the population of the NT and, more specifically Aboriginal Territorians who are the majority residents in remote communities of the NT. Benefits to the Australian population, in general, are largely included in those for the population of the Northern Territory but may be more diffuse or less specific. A range of other, more specific objectives are also included in various policy programs based in the Northern Territory that have relevance to water asset developments associated with the overarching NDP. These are summarised in Section 3.3.3 as *other beneficiaries*.

---

<sup>4</sup> Sourced from <https://naif.gov.au/who-we-are/about-us/> on 15th June 2022. Note that one point, "Encourages private sector participation in the financing of northern Australia's infrastructure needs" has not been included due it being not an objective but rather an assumed pathway to impact (reviewed in Section 3.4).

## THE POPULATION OF THE NORTHERN TERRITORY (ALL)

OBJECTIVES FOR BENEFICIARY	SOURCE
Diversity and resilience in socio-economic conditions in the North	Office of Northern Australia (Department of Infrastructure, Transport, Regional Development and Communication)
<p>A range of socio-economic outcomes that are <u>clearly and unequivocally stated</u> as core objectives for all Northern Territorians including:</p> <ul style="list-style-type: none"> <li>• Health outcomes</li> <li>• Secure and appropriate housing</li> <li>• Connection to culture and community</li> <li>• Education participation and outcomes</li> <li>• Financial security and sufficiency</li> <li>• Access to a natural and built environment that supports a high quality of life</li> </ul>	NTG Social Outcomes Framework (2021)

## ABORIGINAL TERRITORIANS

OBJECTIVES FOR BENEFICIARY	SOURCE
To recognise the needs of Aboriginal Australians in relation to water access and management	National Water Initiative: Policy Guidelines for Water Planning and Management (2017)
<i>A commitment from all Australian governments and Aboriginal and Torres Strait Islander representatives to a fundamentally new way of developing and implementing policies and programs that impact on the lives of Aboriginal and Torres Strait Islander people</i>	Closing The Gap (2019)
<p>A range of socio-economic factors that are clearly and unequivocally stated as core objectives of all Australian Governments including:</p> <ul style="list-style-type: none"> <li>• Health outcomes</li> <li>• Employment outcomes</li> <li>• Economic <i>participation</i></li> <li>• Reductions in over-representation in the criminal justice system</li> <li>• Maintenance and improvement of cultural ties</li> <li>• Independence in decision making</li> </ul>	Closing The Gap (2019)



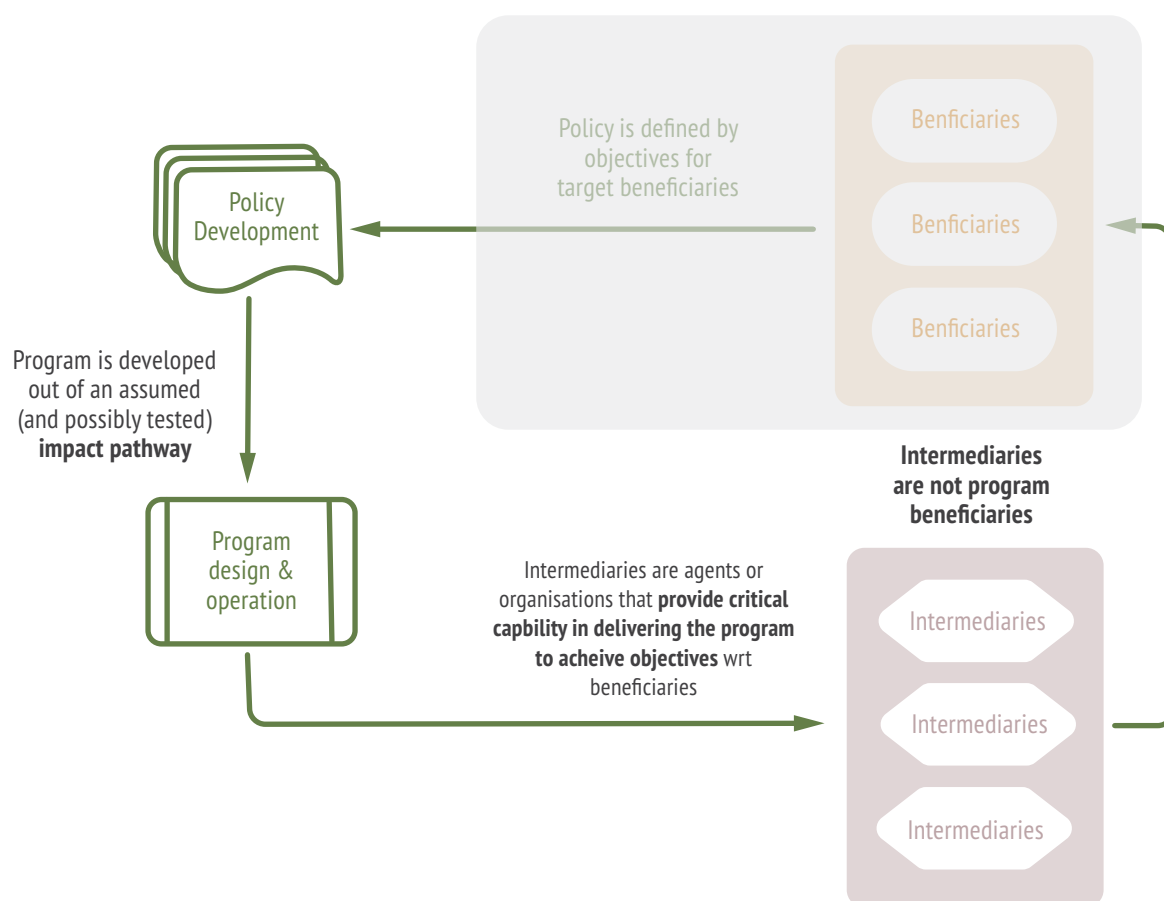
## OTHER BENEFICIARIES IN THE NT

BENEFICIARY	OBJECTIVES FOR BENEFICIARY	SOURCE
Regional Territorians	To grow regional jobs in the short, medium and long term through enabling current and emerging regional industries and attracting private investment.	Territory Economic Reconstruction Commission Final Report (2020)
Agricultural landowners	To sustainably grow the economic outputs of the agribusiness sector in Northern Territory	Northern Territory Agribusiness and Aquaculture Strategy 2030 Discussion Paper (2022)
Tourists (NT, interstate and overseas)	To increase the accessibility and opportunities for tourism in natural environments to increase the value for domestic and overseas tourists in Northern Territory	NT's Tourism Industry Strategy 2030 (2019) Northern Horizons – Unleashing Our Tourism Potential (2018)
Aquaculture and commercial fisheries.	To foster sustainable aquaculture and commercial fisheries in marine and coastal environments, of which many rely on the healthy functioning of water and river ecosystems.	Coastal And Marine Management Strategy Northern Territory (2019)
Recreational anglers	Maintain and enhance the quality of recreational fishing in the NT through ensuring healthy aquatic ecosystems and associated fish stocks.	NT Government recreational fishing development plan 2012-2022
Hunting and shooting groups	To ensure and support the sustainable hunting of key hunting populations in the Northern Territory. Sustainable hunting includes traditional hunting and ethical recreational hunting.	Wildlife Management Program for the Magpie Goose in the Northern Territory of Australia 2020-2030 (2020)

## 3.4 ASSUMED IMPACT PATHWAY

Irrigation infrastructure is assumed to underpin economic development. This impact pathway is the core element of policy programs seeking to generate positive outcomes for target beneficiaries through water asset developments in northern Australia. As outlined earlier in Sections 3.1 and 3.2, the impact pathway assumed for water asset development – *to harness the large amounts of rainfall the north receives each year* (Office of Northern Australia, 2021) – is based on an intermediary framework. Under this framework, intermediaries are the key conduit through which outcomes for benefits are achieved, as shown in Figure 3.

**FIGURE 3:**  
**INTERMEDIARIES IN AN INTERMEDIARY-DRIVEN POLICY-PROGRAM FRAMEWORK**



The specific vision in the case relevant to this review report is to **facilitate the development of agro-food and natural asset-based businesses via increased usage of existing water assets in Northern Australia**. The impact is a range of positive outcomes for the target beneficiaries outlined above. These outcomes are expected to occur through increased employment, population expansion, increased economic value retained in northern Australia, and high levels of inclusivity of disadvantaged groups based in northern Australia due to new economic activity.

The impact pathway that appears to be assumed is depicted in Figure 4. It involves the expectation that, through commercial utilisation of extracted water for irrigation of new agricultural crops and other uses, the Northern Territory will be able to achieve its target outcomes. In addition, the White Paper and the major supporting infrastructure investment facility, the NAIF, indicate that these large investments will be targeted at projects that will achieve an *inclusive* development model: one that targets benefits like employment for disadvantaged groups. Finally, the impact pathway acknowledges the importance of unique savanna ecosystems and states that these investments will be undertaken in an environmentally and culturally sustainable way.

Additional assumptions implied by conventions on the use of public assets (Productivity Commission Act 1998), and explicitly stated in the NDP, suggest that the chosen programs have low opportunity costs: i.e., that there are no alternative options that provide for better outcomes from the expenditure of public money. This *opportunity cost* viewpoint also extends to the more specific case

– the impact pathway chosen to be the core development program for northern Australia - assumes that there are not alternative development pathways that can achieve *better* outcomes, at lower cost, and with greater or equal efficiency.

This *best option* assumption, implied in the White Paper and associated programs (e.g., the NAIF), involves an expectation that the relevant governments have undertaken sufficient due diligence to support the chosen pathway involving the extraction of existing ground water assets and diversion of surface waters as being the best available option to achieve target outcomes for target beneficiaries.

### 3.5 NORTHERN DEVELOPMENT OBJECTIVES, ASSOCIATED BENEFICIARIES, AND ASSUMED PATHWAYS TO ACHIEVEMENT

The concepts and reviews above describe a set of objectives for a development agenda that, for the purposes of this report, is defined as:

*Achievement of major improvements in livelihoods, social cohesion, and economic participation for all Territorians but more so for those Territorians who have experienced long-standing disadvantage. Further, these improvements should occur alongside a maintenance or improvement in environmental sustainability, cultural ties to land for Aboriginal Territorians, and improved recreational, amenity, and non-use values for the unique environmental assets of the Northern Territory.*

This largely aligns with the range of government policy statements reviewed for the purposes of this report. For example the White Paper has the following statements:

*The north has brand advantages associated with being part of Australia, with a well-earned reputation for quality, safety, sound governance and a pristine natural environment. Further development should not be at the cost of these advantages (p2)...*

*Developing the north will need to be done in full partnership with Indigenous Australians, with a focus on creating opportunities through education, job creation and economic development. These opportunities for Indigenous Australians will contribute to achieving the objectives of the Government's Indigenous Advancement Strategy [...] It will need to be consistent with safeguarding the incredible northern environment for future generations (p4)...*

*The investment should provide the highest net benefit of all options available [...] taking into account economic, social and environmental impacts (p51)...*

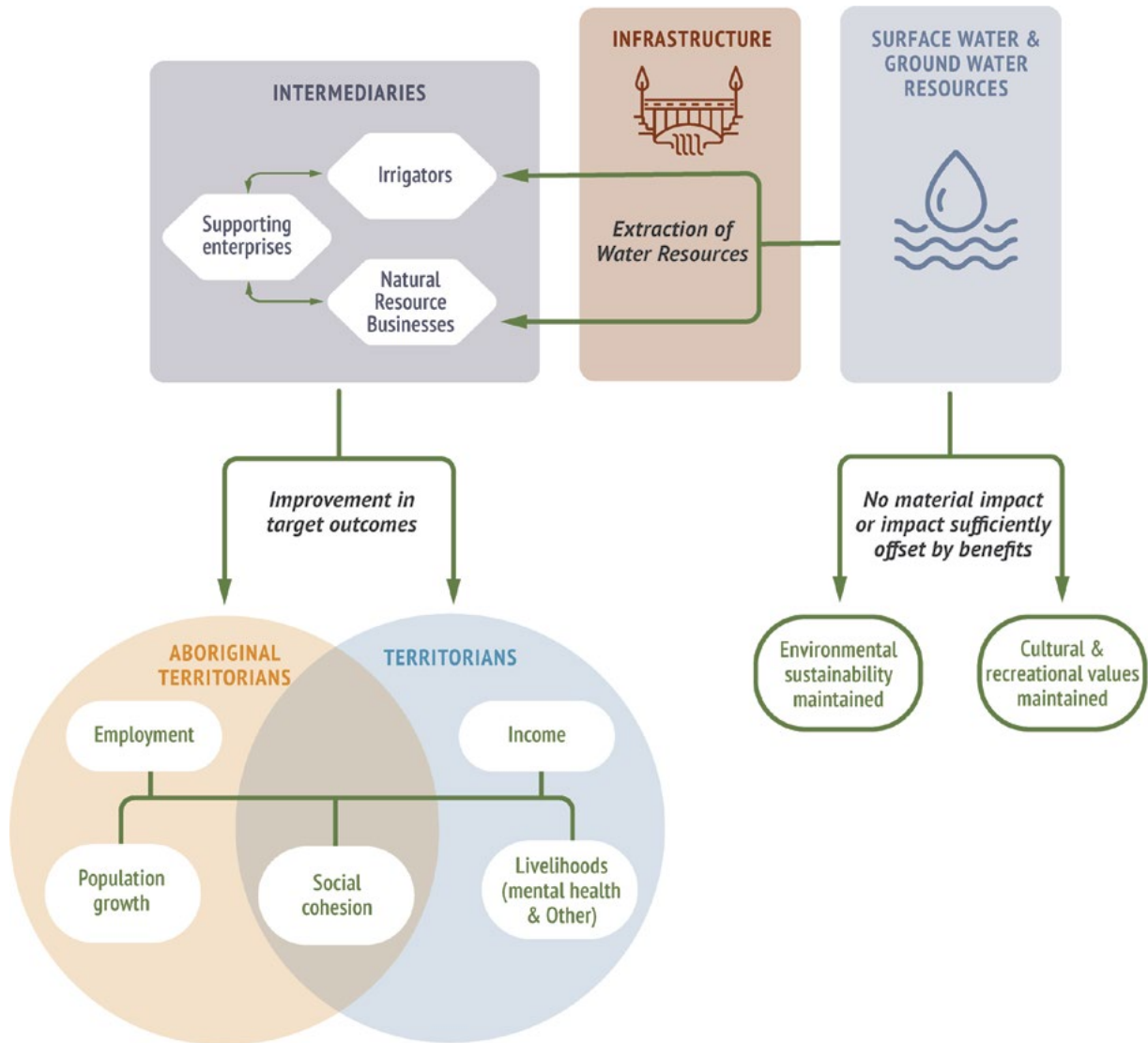
*[...] ensuring local priorities are at the centre of decision making and that infrastructure projects will deliver economic, social, cultural and environmental benefits (p86)...*

*Governments want, by 2035, northern Australia to be meeting its full potential, to benefit people living there as well as those around the country. To achieve this, governments have committed to a series of actions in the coming two decades, which are presented in this White Paper (p122).*

These statements and the review above are indicative of a policy program that has a core rationale associated with inclusive and sustainable development.



**FIGURE 4:**  
**DIAGRAM OF THE ASSUMED IMPACT PATHWAY**



**Note:** This diagram depicts the *assumed* impact pathway of the NDP as derived and described in earlier components of Section 3. *It is not indicative of the true impact pathway* (assessed in Sections 6, 7 and 8).

## **THE PROGRAM IMPACT PATHWAY IS LARGELY FOCUSED ON THE USE OF ENVIRONMENTAL WATER TO SUPPORT AGRICULTURAL ACTIVITIES.**

The approach to achieving policy objectives associated with employment and inclusivity outcomes is largely associated with the use of environmental water assets – streams, overland flows, and groundwater – to support a large increase in irrigated agriculture throughout northern Australia. This objective is made clear in the White Paper:

*This White Paper is an essential part of our plan to build a strong, prosperous economy and a safe, secure Australia. We can take advantage of our strengths and our natural advantages. We will fix the roads and telecommunications, build the dams and deliver the certainty that landholders and water users need (p14)*

*[to] lift the growth speed limits in the north on the foundations of land, labour, water and infrastructure. (p3)*

*Northern development depends on water. Up to 17 million hectares of land in the north have soils which are potentially suitable for agriculture, but there is only water sufficient to irrigate about one tenth of that area (Petheram, et al., 2015). Building the right water infrastructure in the right place will be crucial to realise the full potential of the north (p40)*

The water-focused theme as a core element of the NDP is repeated throughout the White Paper, including prominence in the first two of six over-arching policy goals: *supporting agricultural development* and *developing the North's water assets* (p123).

Further indicators of the primacy of water asset development as a core, if not the core impact pathway assumed in the NDP, are provided in the suggested allocations of funding for natural asset development and infrastructure support for water assets in northern Australia. These include \$200 million that was suggested to be allocated to a Water Infrastructure Fund (White Paper, p127), and feasibility assessments to be conducted for the proposed Nullinga Dam and for Ord River Stage 3 to be completed within two years of the launch of the NDP as outlined in the White Paper. The NT Government, too, has shown a substantial focus on environmental water assets as key elements of investment in agricultural activities with approvals for irrigation development programs spread across the Territory.

## **THE PROGRAM MECHANISM IS BASED ON AN INTERMEDIARY MODEL, RELYING ON AGRICULTURAL AND OTHER BUSINESSES TO SUPPORT AND EVEN DEFINE THE POTENTIAL INVESTMENTS SUPPORTED UNDER THE NDP.**

As outlined earlier, there is a persistent and explicit acknowledgment that the NDP is based on an intermediary framework. Across a range of documents, there is ongoing emphasis on investment in infrastructure, knowledge and regulatory changes as supporting businesses to achieve the development goals (Section 3.3 and Section 3.5.1).

Worthy of note is that the White Paper appears to suggest that these intermediaries are not only the core agents of change in achieving impacts but are also viewed as the best mechanism for the government to define the investments needed to achieve their objectives:

*Governments' role is to create successful business environments, not successful businesses. This is best achieved through prudent economic policies, the right infrastructure to get things moving, regulation that minimises costs on business, a workforce with the right skills, and basic research necessary for business to identify opportunities in the north.*

*Governments have facilitated, rather than led this growth. Business is far better placed to understand the risks and rewards from northern economic development. Governments further support growth by providing essential information, especially where there are basic knowledge gaps (p3)*

*The Commonwealth Government can remove impediments to growth by reducing regulatory risk (while maintaining protections), providing essential information, and underwriting enabling infrastructure (p3)*

*[...] to do all this within a generation or two, and do it right, requires decisive action. It cannot be done with incremental approaches. It will need private sector capital – and lots of it. It will need governments to create the right environment through cuts to unnecessary red tape and strategic investments in infrastructure (p4)*

Whilst not explicit, these statements are indicative of a view that the intermediaries in the NDP are both sought to be used as agents of change and viewed as agents that simultaneously identify the investments needed to achieve program objectives. This choice appears to imply the enabling of potential capture of program mechanisms by the NDP policy program itself – a consideration that would require careful planning and processes of program governance, mechanisms for all potential development pathways to be considered adequately, and considerable monitoring and enforcement provisions to ensure target outcomes are achieved.



# 4 METHODOLOGY





Given the uncertainty about the viability of proposed and funded northern Australian irrigation projects, this study adopts reference case analysis to improve the reliability of costs and benefits in irrigation proposals. Reference case analysis (or reference class forecasting) is a well-accepted and adopted methodology for estimating costs and benefit outcomes in infrastructure planning and business cases based on previously observed outcomes.

Reference case analysis seeks to compare estimates of costs and benefits against the actual performance in a reference class of comparable actions (Flyvbjerg, 2008). Reference case analysis stems from Nobel Prize-winning work by Kahneman and Tversky (1979), who showed that decision makers systematically underestimate the costs, completion times, and risks of projects, and that the benefits of these same projects were consistently overestimated. Specifically, reference case analysis was identified as a mechanism to identify, and rectify, *optimism bias* – the tendency of decision makers to be over-optimistic by overestimating benefits, underestimating costs, and disregarding potential risks (Lovullo and Kahneman, 2003).

### **UNDERTAKING REFERENCE CASE ANALYSIS INVOLVES THE FOLLOWING THREE STEPS:**

- Identification of a number of appropriate reference cases of similar projects already completed.
- Establishing the distribution of outcomes for particular parameters from these reference cases.
- Comparing the proposed project's assumptions of certain outcomes with the distribution from the reference cases to establish whether the expectation is likely.

Reference case analysis has been endorsed by the Productivity Commission (2014) and the Department of Infrastructure and Regional Development (2017). Typically, reference case analysis focusses on capital and operating costs, as there is greater concern over cost uncertainty from funders and relatively more past projects in which relevant cost information can be used as reference cases. For example, Petheram and McMahon (2019) reviewed 98 major dam projects in Australia using reference case analysis to identify cost overruns between proposed and actual capital and operating costs.

In this report we seek to assess the benefits of proposed (and funded) northern Australian irrigation projects. Using reference case analysis, we assess the likelihood of achieving key outcomes related to:

- Construction timelines and scaling of irrigation operations.
- Returns on investment, crop mixes and returns from agriculture.
- On-farm and supporting infrastructure costs.
- Employment outcomes.
- Outcomes for target beneficiaries.

These parameters are the key drivers for most irrigation proposals in Northern Australia which seek to improve irrigated agriculture output and employment outcomes. The key challenge for applying reference case analysis is finding a sufficient number of case studies relevant for the proposals. The number of new irrigation developments in northern Australia that actually proceed to construction is limited to a few case studies such as the recent Ord River irrigation expansions and irrigation from Paradise Dam before remediation works. Agriculture benefits and crop mixes are difficult to establish sufficient reference gross margins given the dynamic nature of input and output prices and environmental conditions across regions, but comparisons using parameters used in project statements themselves are possible.

Given the difficulties in establishing a full quantitative reference case analysis, we adopt reference case analysis principles by considering the assumptions around costs and benefits to observed outcomes in other irrigation projects in Australia. We first review existing literature of irrigation in northern Australia and a select number of current and past irrigation proposals where assumptions can be tested and reference cases can be established. With this data we re-estimate benefit-cost ratios and employment outcomes for the reviewed irrigation proposals.

The focus of this review is the cost-benefit analysis and employment outcomes in business cases and irrigation proposals. This review does not consider the core infrastructure capital and operating costs for dams and water storages, distribution networks or supporting works despite these being key sources of optimism bias through unplanned cost overruns (e.g. Petheram and McMahon 2019).

For an in-depth review of cost overruns on core project costs, Petheram and McMahon (2019) reviewed 98 major dam projects in Australia, finding median and mean dam cost overruns were 49% and 120% respectively, relative to contracted costs. This means findings from this analysis are likely to underestimate optimism bias in project statements.





# 5 EVALUATING NORTHERN WATER CASE STUDIES



This review focusses on a selection of northern Australia irrigation proposals where significant investigations had been undertaken and detailed documentation of cost-benefit analysis and project works were publicly available. The chosen case studies are mostly in Queensland, due to the level of information published from Queensland proposals and the ongoing narrative for irrigation development in Queensland, along with one project in Northern Territory (Singleton Horticulture). These are outlined in Table 1.

Whilst the focus of case studies is mostly on Queensland proposals, the outcomes from this review studies have clear learnings for northern Australian irrigation proposals across Queensland, Northern Territory and Western Australia.

In establishing reference class parameters for the above case studies, existing irrigation projects are also reviewed using publicly available information (summarised in Table 2). This includes the Ord River irrigation schemes and irrigation development using water from Paradise Dam. The CSIRO Northern Australia Water Resource Assessments also provides a range of reviewed irrigation parameters from existing irrigation projects across Northern Australia.

## 5.1 PERFORMANCE OF PROPOSED AND FUNDED PROJECTS

In this section the RCA method is used to assess investment performance for a large number of cases on the basis of:

- Construction timelines and scaling of irrigation operations.
- Crop mixes and returns from agriculture.
- On-farm and supporting infrastructure costs.
- Employment.

The objective of this section is to provide a robust and clear description of the performance of water asset investment projects that would be viewed as reference points for contemporary plans for water asset development.



**TABLE 1:**  
NORTHERN AUSTRALIA IRRIGATION PROPOSALS REVIEWED

CASE STUDY	DESCRIPTION OF CASE STUDY	DOCUMENTS USED FOR REVIEW
Burdekin Falls Dam Raising (QLD)	Feasibility report into the Burdekin Falls Dam raising, which seeks to increase water allocations of up to 150,000 ML in the existing Burdekin Falls Dam. The dam is currently being considered through the EIS and detailed business case stage.	EM Pty Ltd and SMEC Australia (2018)
Cloncurry River Dam (QLD)	The detailed business case for the Cloncurry River Dam.	Jacobs Australia (2019)
Hells Gate Dam Development project (QLD)	The preliminary business case for the Hells Gate Dam located on the Upper Burdekin. Funding was announced for the project in March 2022, subject to a detailed business case and EIS.	SMEC Australia (2018)
Nullinga Dam and Mareeba Dimbulah Water Supply Scheme (QLD)	The preliminary business case for the Nullinga Dam on the Upper Walsh River. A detailed business case was subsequently completed in 2019.	Building Queensland (2017) Building Queensland (2019)
Singleton Horticulture Project (NT)	A proposed groundwater irrigation development in the Western Davenport region in Northern Territory. 40GL of groundwater was recently approved for extraction each year by the NT Government.	Fortune Agribusiness (2021)
Urannah Dam (QLD)	The preliminary business case for the Urannah Dam located on the Broken River. A draft EIS is currently being prepared for the dam.	Bowen Collinsville Enterprise Inc (2019)

## 5.2 CONSTRUCTION TIMELINES AND SCALING OF IRRIGATION OPERATIONS

When assessing the net benefits of a proposed investment, cost-benefit analysis discounts a profile of expected costs and expected benefits into a net present value. If the net present value of benefits outweighs the net present value of costs, the project is considered beneficial for society.

Because of the discounting, how the costs and benefits are profiled can have significant implications on the final net present values with earlier costs/benefits being weighed more highly. Most proposals reviewed assume a three-year construction period, with irrigation development ramping up thereafter. By assuming a shorter construction period, it allows the benefits of the project to start earlier (and thus be weighted more highly). However, this construction period does not consider the time required for the dams to be filled, for water allocations to be distributed and for land improvements to be made.

Another concern in some proposals relates to the scaling of irrigation operations, where lower value annual crops are assumed to establish over 1-3 years and high value perennials crops are assumed to be fully productive after 5-8 years.

However, it has been acknowledged that in most cases irrigation development scales more slowly over a 10- to 30-year horizon as water markets mature and uncertainty on water availability is resolved. We continue to see this with Paradise Dam in Queensland, where most allocations remained underutilised for the 15 years before remediation work.

## 5.3 RETURNS FROM AGRICULTURE

The majority of benefits from large-scale water investments in Northern Australia relate to returns from irrigation. It is assumed that irrigation development can facilitate higher value and more intensive cropping for lucrative domestic and international markets. The crops typically considered include sugarcane, cotton, avocado and other tree crops, horticulture, and to a lesser extent irrigated grains and legumes.

Optimism in annual agricultural returns can suffer from optimism bias from assumptions in the expected crop mix (high vs low value production), and assumptions on the returns/profits for the assumed crop mix.

**In some proposals, crop mixes are assumed to have a high proportion of high value crops such as perennial trees, which typically require high security water allocations. But given the variation of flows in many northern rivers year on year, most allocations cannot be high security, and a higher proportion of lower value crops is more realistic.**

This can be seen between the preliminary and final business cases for Nullinga Dam, where the final business case assumes a much higher proportion of sugarcane production and therefore a much lower net present value (Building Queensland 2019). Paradise Dam is also a good reference point for optimism in crop mixes, where medium priority allocations are inadequate for the expected growth of perennial crop irrigation (Adept Economics 2020).

**TABLE 2:****NORTHERN AUSTRALIA IRRIGATION REVIEWS AND PAST DEVELOPMENTS  
USED FOR REFERENCE CASES**

<b>CASE STUDY</b>	<b>DESCRIPTION OF CASE STUDY</b>	<b>DOCUMENTS USED FOR REVIEW</b>
CSIRO Northern Australia Water Resource Assessments	Investigates the financial end economic feasibility of irrigated agriculture in the Mitchell, Martuwarra (Fitzroy) and Adelaide River catchments.	Stokes <i>et al</i> 2018
Ord River Irrigation Schemes	The Ord River Irrigation scheme is an ongoing expansion of irrigation in the East Kimberly region of WA. Feasibility of expansion of the Ord River irrigation scheme into the NT is currently being explored.	Auditor General of Western Australia (2016)
Paradise Dam	The most recent major dam and irrigation development, located on the Lower Burnett River. Remediation works started in 2020 to improve dam safety, so any comparisons made with Paradise Dam are from before 2019.	Adept Economics (2020)

Returns and profits from the assumed crop mixes also tend to be overstated. Some proposals use Industry Gross Value Add (IGVA) derived from Input-Output analysis to estimate the benefit of agricultural production to the economy. But this method tends to overestimate the value of production when labour and capital inputs are scarce (Gretton 2013), meaning gross margins is a more robust measure of agricultural returns. Compared to the IGVA method, gross margins will provide a lower benefit to the economy of 30% to 50% depending on the crop mix.

**The CSIRO also note in the Northern Australia Water Resource Assessments (2018) that crops with gross margins below \$3000/ha would not generate sufficient revenue to provide a 7% return on developments with capital costs above \$15,000/ha.**

This is despite most proposed developments in Table 2 having a cost per hectare much higher than \$15,000 even before on-farm land improvements and allowing for scaling of operations and the negative effects of risks.



## 5.4 ON-FARM AND SUPPORTING INFRASTRUCTURE COSTS

On-farm costs include all the land improvements, irrigation capital and other associated costs in establishing new irrigation production. Supporting infrastructure includes utilities, roads, worker accommodation, and other supporting services for new irrigation developments.

The reviewed business cases include on-farm costs of between \$10,000-\$15,000 per hectare. This includes all work on the land to start producing annual or perennial crops. The CSIRO (2018) notes that on-farm development costs for new greenfield sites which require upfront land preparation can be upwards of \$40,000 per ha.

In many proposals it is unclear how all supporting infrastructure for irrigation development has been included. A notable omission in many business cases are costs associated with supporting supply chains including transport, processing, and export. Most of the new developments will be in new irrigation areas where access to processing facilities (e.g., a sugar mill), as well as domestic and international markets, is limited. The transport distance limits the viability of products where it can influence the quality of product and where transport costs are high.

**TABLE 3:**  
PROPOSED EMPLOYMENT OUTCOMES FROM IRRIGATION CASE STUDIES

CASE STUDY	PROPOSED EMPLOYMENT FOR CONSTRUCTION (DIRECT EMPLOYMENT)	PROPOSED EMPLOYMENT FOR OPERATIONS (DIRECT EMPLOYMENT)
Burdekin Falls Dam Raising (QLD) – Low cost	1,355 FTEs	499 FTEs
Burdekin Falls Dam Raising (QLD) – High cost	2,702 FTEs	1,029 FTEs
Cloncurry River Dam (QLD)	396 FTEs	58 FTEs
Hells Gate Dam Development project (QLD)	4607 FTEs	4565 – 6975 FTEs
Singleton Horticulture Project (NT)	Not stated	110 permanent staff 1350 seasonal staff
Nullinga Dam and Mareeba Dimbulah Water Supply Scheme (QLD)	Not stated	176 FTEs
Urannah Dam (QLD)	1200 FTEs	675 FTEs

**Note** – Only direct employment outcomes are reported.

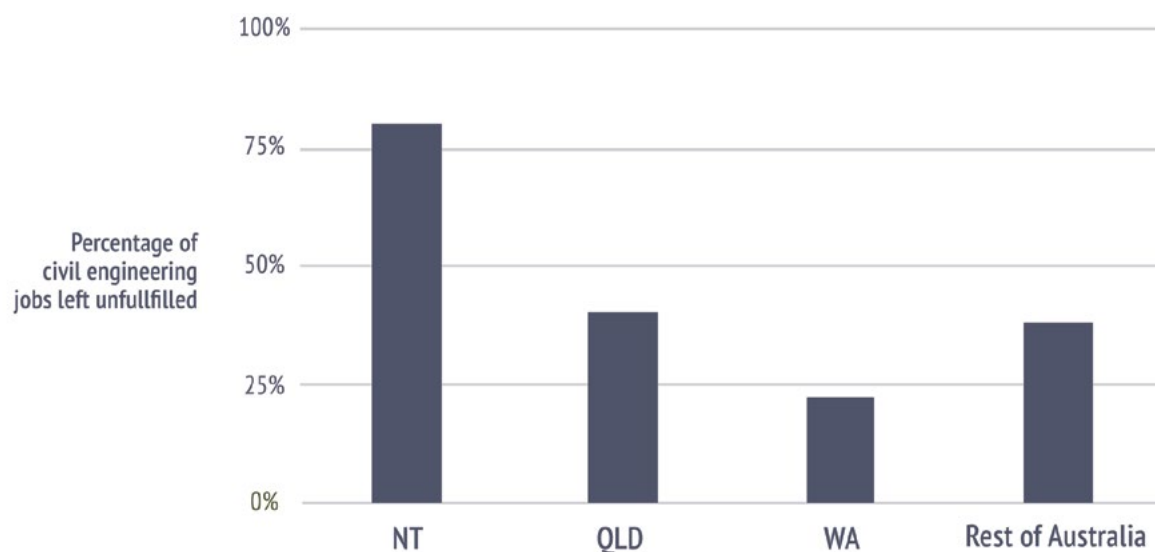
## 5.5 EMPLOYMENT OUTCOMES

A common justification for irrigation development is the employment outcomes for regional communities and opportunities for employment of Aboriginal Australians. Employment outcomes are typically calculated through input-output analysis, which considers the direct and indirect employment outcomes from construction of infrastructure and ongoing employment from supporting new irrigation developments. These employment outcomes are often large, as summarised in Table 3. However, employment outcomes for regional communities and Aboriginal Australians are often overstated in proposals for two reasons.

Firstly, input-output analysis assumes an unconstrained supply of labour at a fixed price. In other words, there is a limitless supply of unemployed workers ready to be employed by an irrigation project. This assumption is frequently argued by economists to be unreasonable (Gretton 2013), particularly for the agricultural and construction sectors where labour availability is typically constrained.

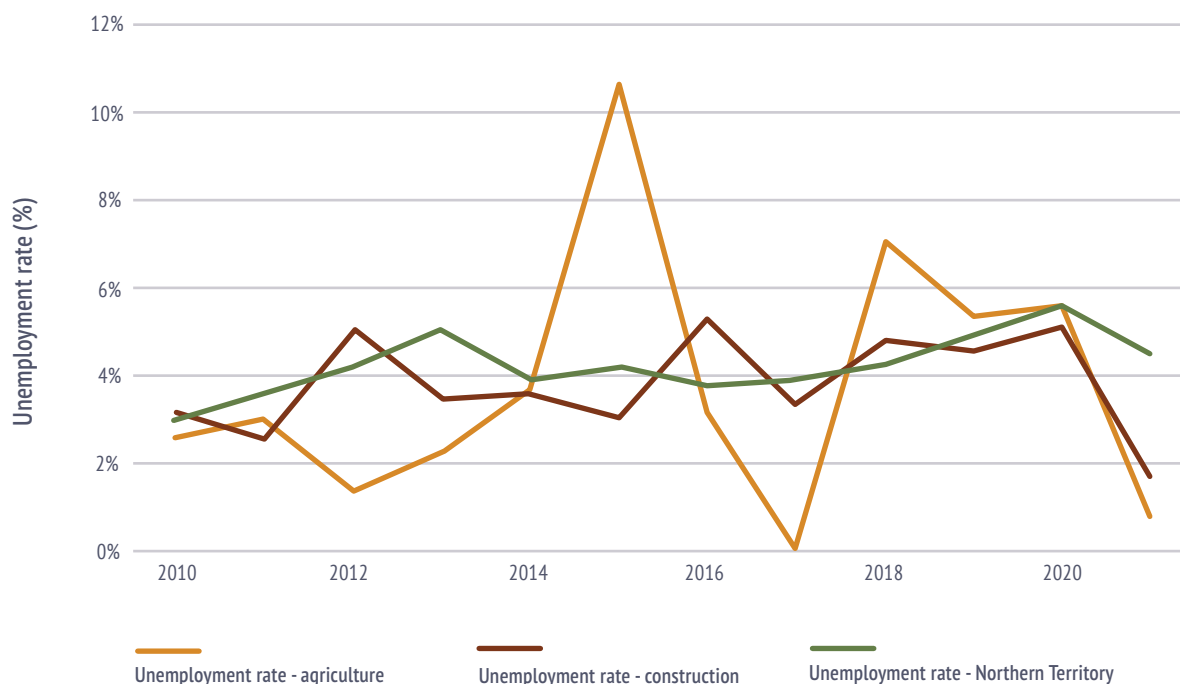
For construction, Infrastructure Australia notes that labour shortages are a significant risk for project costs and delivery (Infrastructure Australia 2021). This is demonstrated through the number of civil engineering jobs left unfilled in northern Australia, where over 75% of positions advertised in the Northern Territory could not be filled (see Figure 5). These shortfalls were observed before COVID 19-related labour shortages, which saw a further 33.5% decline in skilled migration for the construction sector.

**FIGURE 5:**  
CIVIL ENGINEERING JOBS LEFT UNFILLED IN AUSTRALIA (2019)



Source – Adapted from Infrastructure Australia 2021. Note - Rest of Australia is a simple average of other state totals.

**FIGURE 6:**  
UNEMPLOYMENT RATE IN NT BY INDUSTRY



*Source* – Author analysis. Data from the Australian Bureau of statistics (2022a, 2022b, 2022c)

For horticulture, a report by Ernst and Young (2020) estimates labour shortages of over 25% during the high-intensity harvest periods across Australia. These issues were apparent before COVID 19-related labour constraints, when a national survey of horticulture growers found 40% of respondents indicated that they had not been able to recruit sufficient labour (Howe *et al.* 2019). These labour shortages are more severe in remote locations where living conditions are less attractive, where there is time-sensitive harvest, and where harvest conditions are hotter.

Figure 6 shows the unemployment rate for the Northern Territory, and the unemployment rate for the construction and agricultural sectors. Whilst both construction and agriculture employment tend to fluctuate given the nature of employment (i.e., a large proportion of workers on casual and seasonal roles), the average unemployment rates over the previous 10 years for construction and agriculture are lower than the unemployment rate for the Northern Territory - an average rate of 3.9% and 4.0% for agriculture and construction respectively during 2010-2021, compared with a statewide average of 4.6% over the same period. In 2021 especially, unemployment for these sectors has been between 1% and 1.7%, well below the *natural* unemployment rate of 4.5% (Ruberl *et al.* 2021).

Subsidising growth in labour constrained sectors such as agriculture will have more complex employment outcomes than the input-output analysis suggests, as some employment will likely shift from other projects or regions and real wages might increase due to increased labour scarcity. The higher real wages will then have implications on the viability of the proposed irrigation developments, or for agriculture in other regions.



Accounting for labour scarcity and real wages, Wittwer and Banerjee (2018) used a CGE model of irrigation development in Northern Australia and found that employment outcomes relative to the size of the investment were small.

**The majority of new jobs from the irrigation development and infrastructure construction will not actually be new employment, but will likely be from the employment of workers who would have otherwise have been employed in construction or agriculture elsewhere.**

Secondly, most employees for irrigation developments are typically not from the region. Ernst and Young (2020) report that the median number of local employees for horticulture is 10%. As evidenced in the 2019 NT Farmers Association Workforce Development Plan, overseas workers represent 63% of total labour during the harvest season in the Northern Territory, and a further 28% comprised interstate workers. Many producers find it difficult to attract Australian workers due to the seasonal nature of the roles offered, the remote locations and the lack of contract security. Large infrastructure construction in regional areas also has the same reliance of fly-in-fly-out workers.

**The CSIRO report for the National Water Infrastructure Development Fund (2018) reviewed major dam projects in northern Australia and found that only 10% to 20% of workers will be employed locally, on average, across northern Australia, with a much lower percentage of local employees in remote regions.**

Of this 10%-20% of local employment, very few positions are expected to be filled by Aboriginal Australians. Seasonal employment from irrigation projects provides limited job security throughout the year and the physical nature of the work is unsuitable for many workers. Employment is often sourced from labour hire agencies, favouring employment of individuals from outside of the region. For an appropriate benchmark we can use the total Aboriginal employment outcomes from the Ord River Irrigation Scheme near Kununurra, WA. Kununurra has a similar proportion of Aboriginal Australians to many regional communities in the NT. The WA Auditor General found that 21% of Ord irrigation project labour was provided by Aboriginal Australians in the initial stages of irrigation development and production. When taken in combination with the already low number of local residents employed, this suggests that only 20% of the 10%-20% of total employment will be filled by Aboriginal Australians (2%-4% of total employment on average).

The above suggests that employment outcomes from irrigation projects are substantially overstated due to incorrect models used to estimate new jobs and the failure to recognise the reliance on distant labour forces. Where construction and agricultural labour markets remain constrained, the proposals are likely to have minor to no new employment in aggregate, and limited opportunities for employment for regional communities and Aboriginal Australians.





# **6 REFLECTIONS ON UNDERLYING PERFORMANCE ASSUMPTIONS**



## IN THIS SECTION, WE SUMMARISE THE CORE RESULTS ACROSS FIVE KEY INSIGHTS:

1. The presence of persistent optimism bias in proposed projects seeking to use natural assets to support investment projects
2. Project impact pathways are assumed, not tested, and are largely without supporting evidence
3. Welfare outcome targets are highly unlikely to be met and likely could be more easily achieved by direct investments or consideration of alternative programs
4. There are serious concerns around governance failures, potentially associated with a failure to understand intermediary models by successive governments
5. There are major concerns around the failure to consider alternative pathways to achieve welfare and development objectives for people living in northern Australia, particularly surrounding environmentally and culturally sustainable forms of development

### 6.1 OPTIMISM BIAS IN PROJECT INVESTMENT/ PERFORMANCE ASSUMPTIONS

Across all key measures outlined in Section 3, there is a persistent difference between the stated expectations of projects and their eventual outcomes that, in all cases, made the project appear better than it really was. The persistence of this effect is striking and significant.

While misfortune may play a role in some cost overruns or failed benefits, it is generally accepted that the cost and benefit outcomes relative to expectations are too consistent and one-sided (Flyvbjerg, 2007). It is more generally accepted that decision-making processes tend to suffer from optimism bias, the tendency for people to be over-optimistic by overestimating benefits, underestimating costs, and disregarding potential risks (Lovallo and Kahneman, 2003).

Similar incentives are apparent in major water infrastructure in Australia, where the costs are initially borne by governments and, over time, recovered through water sales. Under this funding model, governments assume the burden the majority of risks associated with cost overruns or failure of benefit realisation. As a result project beneficiaries have incentives to overstate the benefits of projects and understate costs in preparing business cases if it helps achieve project funding. Other stakeholders such as contractors and politicians have related incentives if they stand to benefit from the project, for example, through new contracts or political support, but face little to no risks or consequences from inaccurately stating costs or benefits.

Whether optimism bias arises from deception or delusion, there are significant economic and social costs associated with optimism bias. It leads to decision-makers funding projects where the costs exceed the benefits or directing resources away from potential projects that deliver greater benefits. To overcome optimism bias, Flyvbjerg *et al.* (2005) proposed using reference class analysis which uses actual cost and benefit outcomes rather than assumptions and estimates. Case studies are first identified as reference class projects, and the costs or benefits are mapped to empirical distributions. The proposed project is then compared to these distributions to provide an empirically and statistically grounded judgment.

The Australian Government has recognised the potential for project failure associated with the overstatement of benefits, explicitly describing the important role of benefit-cost analysis undertaken independently of a project proponent in providing a robust description of actual expected social and economic benefits:

*Government plans can be uncertain and infrastructure projects sometimes lack appropriate cost benefit analyses. It can be difficult for governments to determine which projects are most valued because users may overstate their benefits if they do not have to pay for them. Cost benefit analysis is an important tool for governments to evaluate projects and determine spending priorities*

*White Paper (2015, p8)*

## WHAT IS OPTIMISM BIAS AND WHY DOES IT OCCUR?

Optimism bias derives from a combination of cognitive biases that produce overestimation (delusion) and strategic misinterpretation due to inconsistent incentives (deception) (Flyvbjerg 2009). Delusion occurs when people are systematically and predictably too optimistic about the time, costs, and benefits of a decision, and is a well-established cognitive bias amongst managers and decision makers (Kahenmann and Lovallo 1993). Cognitive optimism bias may derive from a person's illusion of control over risks and outcomes, or the narrow framing of projects being considered as unique where learnings cannot be drawn from previous experiences (Kahenmann and Lovallo 1993). Anchoring bias occurs when decision-makers fixate on initial forecasts and expectations and subsequently face difficulty adjusting.

There is significant evidence to suggest large infrastructure projects often suffer from systematic cost overruns, failed benefit realisation and significant delays. Meta-analysis of a variety of infrastructure projects across the world indicates that inaccuracy in cost estimation ranges from 20.4% to 44.7% depending on the type of project (Flyvbjerg *et al.*, 2003, 2005). Examples of cost overruns and failed benefit realisation are common.

These issues extend to large scale water and irrigation projects. Ansar *et al.* (2014) report that three out of four hydropower dams investigated suffered from cost overruns, with actual costs on average 96% higher than expected costs. Higginbottom *et al.* (2021) find that for every 100 hectares proposed by over 75 irrigation projects in Sub-Saharan Africa from 1948 to 2005, a median of only 16 hectares of irrigated production was eventually delivered. **Across 98 major dam projects in Australia, median and mean dam cost overruns were 49% and 120% relative to contracted costs (Petheram and McMahon 2019).**

Deception, or strategic misinterpretation, occurs when there are misplaced political incentives and agency problems between stakeholders involved in the planning, construction and outcomes of large infrastructure projects, leading to flawed decision making (Ansar *et al.* 2014, Flyvbjerg 2009). For example, Flyvbjerg (2018) provides examples where professionals know that outturn costs will be higher than estimated costs, but because of political pressure to secure funding for projects this information is withheld in order to not threaten potential funding.

## 6.2 PATHWAYS TO IMPACT NOT BASED ON APPROPRIATE CONCEPTUAL OR EMPIRICAL MODELS

In all policy and program documents that provide the basis for the development of water assets as a consumptive resource (i.e., extractive use of water), the impact pathway is presented as a given. In no case was this review able to find any information supporting analysis of alternative pathways available to achieve target outcomes for target beneficiaries or that the chosen pathway was the *best available option*. The lack of supporting evidence for the chosen pathway alone raises concerns. However, combined with the extensive evidence that the chosen pathway appears to fail on effectiveness, efficiency, and inclusivity factors, the lack of support for the chosen pathway is indicative of a fundamental failing in the development of policies and associated programs for the NDP. A minimum expectation of government use of public resources (e.g., financial capital) is that associated programs have some reasonable expectation of success. This expectation is clearly stated in the White Paper:

*It can be difficult for governments to determine which projects are most valued because users may overstate their benefits if they do not have to pay for them. Cost benefit analysis is an important tool for governments to evaluate projects and determine spending priorities (p8)...*

*The right infrastructure investment can be transformative for regions, but the wrong infrastructure wastes resources and can lock communities and governments into poor outcomes through, for example, expensive maintenance and long term debt (p84)*

This minimum expectation not only appears missing in the case of the chosen approach to the NDP, but concerningly, this and other pre-existing reviews show overwhelming evidence that the chosen approach is likely to fail on the majority of target outcome criteria. It appears that independent benefit-cost analysis has not occurred and has not been made possible in the case of the NDP despite its clearly stated prioritisation when guiding government investment decisions. Indeed, the paucity of data over the large investment program undertaken by the NAIF and the NWIDF severely limits independent review of these programs and associated investments.

In addition, this review shows that targets for maintenance of environmental sustainability associated with water asset development for northern Australia are unlikely to be achievable under the approach to investment being taken. The largely intact status of northern Australian ecosystems is heavily reliant on the continued water regime, including the presence of large seasonal overland flows, and river flows to the ocean (Burford *et al.* 2015). The current Arid Zone rules around water extraction in the Northern Territory, and any potentially arbitrary changes to designations of areas as belonging to those areas, are likely to cause severe ecological stress and significantly impact on cultural values associated with these landscapes. The assumption in the NDP appears to be that natural water assets are *wasted* in-situ, and that no other use or non-use values are material for northern Australia. The implied changes to water flows in the Northern Territory that would be associated with the large program of development envisaged within the NDP would be likely to substantially affect ecological health, cultural values and recreational opportunities, including potentially major impacts on highly valued recreational fisheries (Burford *et al.* 2015).

Finally, the water extraction models used to consider *sustainable* yields from water assets in the Northern Territory do not appear to have adequately considered variability in rainfall for northern Australia. Recent evidence (e.g. O'Donnell *et al.* 2015) indicates that the models used may be highly optimistic with regards to near-term rainfall and aquifer recharge expectations, suggesting that there is a high probability that these systems are already over-allocated.



## 6.3 GOVERNANCE CONCERNS PERVADE NORTHERN DEVELOPMENT AND WATER ASSET DECISIONS

The results above are indicative of major concerns around the policy development and approval processes for projects associated with the NDP, for example, including the alignment of the NAIF and NWIDF with extractive pathways and in the application process for the NAIF or other facilities, and direct approval processes by the Northern Territory Government.

Carmody (2021) outlines the concerns clearly in the case of the Singleton irrigation proposal as involving evidence that can only be seen as relating to the capture of government by an intermediary. This concern is also pervasive throughout the review results shown in Section 6 with large projects - expected to generate major benefits to local communities and economies in an environmentally sustainable way - failing against these statements. The declarations around project outcomes, as indicated by the project proponents, and typically supported by government statements, have been shown to be so erroneous that it is hard to believe that funding processes have reviewed these projects with any intent to reveal their true likelihood of success.

The patterns of over-stated benefits, if matched by supporting statements on intent and prefaces of policy documents, commonly focus on investment to support health, education, sustainability, and income outcomes for people living in northern Australia. Yet these same policies/programs specify approaches that have been proven to fail. They also involve the transfer of large sums of taxpayer money to private enterprises which achieve none of the core objectives those funds were ostensibly released for. Given the similarity of the pattern of failure and the language used by both supporting governments and the private proponents of projects, the remaining conclusion is that the governance processes associated with NDP settings and approval processes have and continue to fail to achieve the stated target outcomes.



These concerns are potentially an outcome of the application of intermediary governance models without fully considering their greater potential for failure. Specifically, whilst intermediary models of governance are potentially powerful as mechanisms to deliver multiple outcomes in complex social and economic settings, they are also unsound due to the ability of intermediaries to redirect benefit flows toward themselves. In the rush to *develop the north*, the Commonwealth and Northern Territory Governments have assumed that the *rising tide* of irrigation development achieved through public largesse directed at private-sector irrigation investments will accomplish all of their social and economic aims. This is not the case, with approvals such as the Singleton irrigation development indicative of governance failures (EDO 2021), at least in terms of approvals.

## 6.4 FOREGONE CULTURAL AND ENVIRONMENTAL VALUE OF THE WATER ASSETS

While the projects reviewed above often promote minimal negative or even beneficial impacts on environmental and cultural values, there is consistent evidence to suggest the opposite is true. Even though the White Paper assures that, *developing the north will need to be done in full partnership with Indigenous Australians*, Aboriginal Australians' voices are often not considered or they are constrained by limited power to influence or veto proposed infrastructural developments. Specifically, due to historically embedded and ongoing power asymmetries, many target beneficiaries of water development projects have limited say in how those projects happen, or if they even want them to occur in the first place.

**For Aboriginal Australians, and many other groups in northern Australia, these waterscapes are much more than a natural asset for extraction. Healthy and free-flowing inland water systems are vital to Aboriginal Australians' cultural connections to place (Jackson & Barber 2013, 2016) and have direct value as sites of recreational fishing and tourism central to a Territorian way of life.**

Indirect values are those that support natural assets for a range of other-use values including offshore fishing and tourism; as essential parts of broader ecosystems supporting healthy plant and animal life; and simply as living entities integral to northern Australian culture, environment, and spirituality (Laborde & Jackson 2022).

The massive investments proposed for water asset developments are juxtaposed against a major policy goal of the NDP that involves a *thriving and sustainable fishing industry* (p124). Whilst it may be possible for large increases in water extraction to co-exist with a thriving fishing industry, there are real concerns that major changes to the use of seasonal water flows would severely impact on a range of major recreational and commercial fishery species.





**7 WORKING TOWARD AN  
IMPROVED DEVELOPMENT  
MODEL FOR NORTHERN  
AUSTRALIA**



In this section, core requirements are considered for any *development* program that actually meets the objectives of the NDP as stated in the White Paper. This development agenda is:

*Achievement of major improvements in livelihoods, social cohesion, and economic participation for all Territorians but more so for those Territorians who have experienced long-standing disadvantage. Further, these improvements should occur alongside a maintenance or improvement in environmental sustainability, cultural ties to land for Aboriginal Territorians, and improved recreational, amenity, and non-use values for the unique environmental assets of the Northern Territory.*

## 7.1 ADDRESSING OPTIMISM BIAS IN FUTURE WATER ASSET PROJECTS

A key first step in working towards improved outcomes from future water asset allocation and investment decisions is to require benefit-cost analysis with clear protocols for considering historically repeated patterns of optimism bias in irrigation.

The importance of an unbiased independent review of business cases for irrigation proposals highlighting necessary adjustments of expectations of irrigated benefits in line with reference class expectations is highlighted in the example of the Nullinga Dam and Mareeba Dimbulah Water Supply Scheme. A preliminary business case for the scheme was prepared by Building Queensland after being promoted by local proponents, finding the project to be net beneficial (2017). A detailed business case was then prepared by Sunwater and Building Queensland (2019), which consequently found that previous assumptions on agricultural benefits and project costs were overly optimistic. The business case analysis revealed that the proposed Nullinga Dam was neither financially nor economically viable and was pursued no further by the Queensland State Government.

While the business cases and feasibility studies required a significant amount of public investment, the process to consider the robustness and importance of assumptions, publish these for independent review, and make decisions based on the outcomes of the business case should be at the very minimum a standard process. There is also a need for an underlying knowledge investment to develop an extensive reference-class-performance record and to grow a monitoring database that tracks actual relative to assumed performance prior to implementation.

## 7.2 IMPROVING GOVERNANCE

The White Paper describes the importance of water pricing mechanisms and water governance, stating:

*A clear lesson from Australia's past is that when water is under-priced, it will be wasted. [...] Existing water rights [in the north] can be overly prescriptive or uncertain due to the lack of a transparent water planning process [...] governments should not compound uncertainty through opaque planning processes (p45)*

Despite this clear statement of intent around northern water asset governance, it appears to have been essentially ignored. For example, the Australian National Audit Office (ANAO) points out that the concept of the NWIDF was developed while the Coalition was in opposition (whilst the White Paper was published whilst they were holding government) and that:

*The rationale for the Fund's capital component relied more on assertions about project readiness than evidence, particularly taking into account the lack of 'shovel ready' projects and long lead times to progress projects through development phases. The advice to Government on the selection of the first Fund feasibility studies and water asset assessments announced in the Developing Northern Australia White Paper was not underpinned by documentation demonstrating: that all projects were assessed consistently and categorised on merit; and the rationale for project funding recommendations from the broader field of projects under consideration.*

*ANAO (2017, p9)*

This statement by the ANAO reflects possible concerns first raised in Section 3.5 – that the use of an intermediary model as the core impact pathway for the NDP was chosen without due consideration of associated regulatory and policy concerns/mechanisms. This concern was increased given an apparent focus on using intermediaries to not only carry out policy program activities (e.g., irrigated agriculture businesses) but also to identify potential business opportunities supported by public investment. This approach generates clear potential for a conflict of interest between the private proponent of public investments in water asset developments and the public interest in generating positive outcomes for target beneficiaries. This is combined with apparent insufficient independent review of the public benefit assertions of private proponents of projects to be funded under the NWIDF or NAIF.

This review report is not conclusive on whether there have been governance failures within water asset development and investment programs in the Northern Territory explicitly associated with the NDP. Yet there are worrying indications that the entire structure of the NDP is built on the assumption that intermediaries, namely large private sector businesses, will identify *opportunities* for co-investment by governments that will achieve target outcomes for target beneficiaries, notwithstanding the clear failure of these programs in actually achieving target outcomes.



Even in cases where governance has been carefully considered, the use of similar models for intermediaries has failed with disastrous consequences (e.g., the Credit Ratings Agencies case reviewed in Kruck 2017). Also, importantly, and perhaps overlooked in the White Paper, is that businesses and agricultural operations that are target co-investors in water asset infrastructure in the North are not target beneficiaries but rather are assumed to act as intermediaries supporting the assumed project impact pathway.

Most importantly, this review shows that governments can no longer assume that project benefit statements provided by the private sector, or their own Departments, are unbiased or will achieve the stated positive social outcomes they usually identify as critical for public support. Furthermore, this review and associated references show that governments should actively seek to ensure their policy programs avoid capture by intermediaries or other stakeholders. This should be achieved through independent review with broad-based reference terms focused on effectiveness with respect to target outcomes, target beneficiaries and efficiency of program operations.

Governance concerns are not only associated with the Commonwealth Government. For example, a recent proposal for major water development involved the gifting of large amounts of non-renewable groundwater, currently supporting important desert ecosystems, to a single privately owned agricultural enterprise based in Victoria. This proposal involved international financial backers and provided little evidence of material benefit to local and Territory constituents (ECNT 2021). There is a potential conflict of interest, in this case, between the ability of a large private sector actor to propose a project that is in their private business' interest and the reliance by the government on those private-sector actors being the only pathway to achieving inclusive and sustainable development objectives.

## 7.3 CONSIDERATION OF OTHER POLICY OPTIONS

When policy programs start with a defined impact pathway, and more importantly one that has been poorly selected and is likely to fail, then we can expect program failure.

The review of data in Section 6 is indicative that the NDP is promoting proposals that are unlikely to meet basic investment criteria in many cases. Furthermore, it emphasises that the rollout of the program has been associated with investments that are highly unlikely to meet the criteria underpinning the rationale outlined by the program itself as described in the White Paper.

A recent high-profile example is the Hells Gate dam. This likelihood of this project failing to produce a return on investment is well documented (Saunders and Dennis 2022), and yet a \$5.4 billion commitment was made to the project. The fact that such a commitment can be made without needing to see at least equivalent socio-economic benefits is strongly indicative of regulator capture in the NDP, and of the contemporary program being at least as likely to fail as those that have failed previously. It also goes directly against statements made in the White Paper regarding the important role of benefit-



cost analysis in helping governments to identify the best possible investment options available to achieve social and economic objectives:

*It can be difficult for governments to determine which projects are most valued because users may overstate their benefits if they do not have to pay for them. Cost benefit analysis is an important tool for governments to evaluate projects and determine spending priorities (p8)...*

*Support for new water infrastructure should not be prescriptive. It should match the best available supply options with demand to ensure ongoing economic viability. It is important for consideration of investments in new dams to be underpinned by robust economic analysis to ensure returns are commensurate with the level of investment (p41)...*

*The right infrastructure investment can be transformative for regions, but the wrong infrastructure wastes assets and can lock communities and governments into poor outcomes through, for example, expensive maintenance and long term debt (p84)...*

[Regarding investments in water infrastructure]:

*[...] The investment **should provide the highest net benefit of all options available to increase access to water, taking into account economic, social and environmental impacts;***

*Projects should address a **market failure** which cannot be addressed by proponents, state and territory governments or other stakeholders and limits a project of national significance from being delivered;*

*Projects should align with the Government's broader infrastructure agenda to promote economic growth and productivity, or **provide a demonstrable public benefit and address a community need;***

*Projects should align with the National Water Initiative principles including appropriate cost recovery and, where full cost recovery is not deemed feasible, **any subsidies are fully transparent to the community;***

*If providing capital, **a consistent robust analysis of costs and benefits is used** and assessment is undertaken by Infrastructure Australia or similar experts. (p51)*

*[our emphasis]*

## 7.4 ESTABLISHING FUTURE 'NORTHERN DEVELOPMENT' PROGRAMS

It is time that the development program of northern Australia was decided by those who are the target beneficiaries of a *northern development* program and that, given the history of promotion of projects that result in net losses to the Australian public, basic *independent* appraisals are used to assess government investment proposals for northern Australia.

Key questions we should be asking in this program are antecedent to the actual pathway through which target outcomes for target beneficiaries will be achieved. We provide a brief overview of the types of questions that should be asked in a review of the *northern development* program in Table 4.

**TABLE 4:****BASIC QUESTIONS FOR POLICY MAKERS AND GOVERNMENT IN CREATING PROGRAMS FOR NORTHERN DEVELOPMENT BASED ON NATURAL ASSETS**

TOPIC	QUESTIONS
Target beneficiaries and target outcomes for those beneficiaries	<ul style="list-style-type: none"> <li>• Who are the target beneficiaries of ‘northern development’?</li> <li>• What are the target outcomes for those beneficiaries?</li> <li>• Can we create a clear reference and indicators framework to efficiently monitor project performance against target outcomes?</li> </ul> <p><i>Note: these have been identified in this report but would benefit from explicit clarification in order to facilitate program design and evaluation</i></p>
Comparative cases for review and learning	<ul style="list-style-type: none"> <li>• What other programs exist or have existed that had similar types of (inclusive and sustainable development) objectives in similar environments?</li> <li>• Are there learnings that can be gained from these in terms of: <ul style="list-style-type: none"> <li>• Operation/governance</li> <li>• Successes</li> <li>• Failures</li> <li>• Use of natural assets (e.g., water)</li> </ul> </li> <li>• What technologies or intermediary-based approaches were used in those models?</li> <li>• What would these cases potentially look like when applied to the northern Australia case?</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>• What other types of infrastructure investments might better generate activities that are more likely to meet target outcomes?</li> <li>• Is there scope for government to directly invest in this infrastructure and associated activities through the beneficiaries rather than intermediaries?</li> <li>• What risks does an intermediary-driven framework have for this approach to investment and do the potential benefits offset those risks?</li> <li>• Can risks from intermediary-driven approaches be effectively and efficiently moderated through improved program design and governance?</li> </ul>

TOPIC	QUESTIONS
Technologies and value chains	<ul style="list-style-type: none"> <li>• Are there new technologies that can provide for achievement of target objectives without reliance on extractive models?</li> <li>• Can alternative technologies and value chains provide for a more targeted model for target beneficiaries and more efficient achievement of target objectives for those beneficiaries?</li> <li>• What requirements would be needed to develop these alternative approaches?</li> <li>• Can they support 'in-situ' development outcomes that do not need major changes to populations and residential location (i.e., can they support remote community development outcomes)?</li> <li>• Do they avoid the need for major changes to the use of natural assets such as water?</li> </ul>
Development framework	<ul style="list-style-type: none"> <li>• How can we avoid the repeated cycle of failure that generates massive costs to the Australian public but fails to achieve core aims?</li> <li>• Can key groups concerned about the health of northern rivers and water assets form a coalition to better drive an inclusive and sustainable development agenda for northern Australia? <ul style="list-style-type: none"> <li>• What compromises would these groups need to undertake to gain agreement?</li> <li>• What benefits would these groups obtain from creation of a coalition?</li> <li>• What are the core norms of behaviour/policy for this coalition to operate effectively and for the benefit of all members?</li> <li>• Who would need to be in the coalition in order to generate a strong socio-political force promoting an appropriate model for inclusive and sustainable development in northern Australia?</li> </ul> </li> </ul>
Environment	<ul style="list-style-type: none"> <li>• Are there development programs that are not reliant on extraction of natural assets but that can support non-extractive (of those assets) activities?</li> <li>• What are the true implications of natural asset extraction models for future sustainability?</li> <li>• What are the opportunity (option value) costs of extraction of natural assets, particularly when these extractions lead to effectively permanent changes to the ecological function of that asset?</li> <li>• How are natural assets being priced to ensure the benefits of their extraction are shared in an equitable way between the project proponent and residents of northern Australia?</li> </ul>









## 8 CONCLUSION



For over a century, the *develop the north* myth has sought to position water as *wasted* and as being central to achieving social and economic development objectives (Megarrity 2018).

**On both counts, these assumptions have been proven wrong.**

Most importantly, there is no basis for the central emphasis on the extraction of environmental water assets, particularly as supporting irrigation projects, to underpin economic development in northern Australia. The majority of investments have failed repeatedly. The few that continue to operate fail on the basis that the benefits they generate for the local economy and the people living in northern Australia are far lower than envisaged.

This report considered the performance of the Northern Development Program (NDP) in terms of:

- The objectives of the NDP as outlined by the key underpinning policy document - the White Paper on Developing Northern Australia (2015), and supporting documents;
- Basic project financial and social performance considerations that publicly funded projects are expected to seek in order to provide value to the residents of Australia (Productivity Commission 1998) – a target also endorsed by the White Paper.

The White Paper proclaims itself to be the last word on northern development:

*Through this, the first ever White Paper on Developing Northern Australia (the White Paper), the Commonwealth Government is putting in place the right policies, at the right time, to unlock the north's vast potential. This White Paper has been developed to stand the test of time – it should be the first, and last, White Paper for the north. (p1)*

The White Paper positions itself as different from earlier attempts at developing northern Australia via investments in irrigation infrastructure (see Megarrity 2018 and Davidson 1972 as well as this review). It is unclear where this view of difference arises, however, other than much larger levels of Commonwealth Government expenditure tied to the NDP. The current revision of a centuries-old northern development vision retains misguided assumptions on the primacy of the use of natural water systems to support irrigation development as the key basis for the economic and social development of northern Australia. This project undertaken at scale is likely to generate significant losses to the Australian public, destroy large tracts of pristine natural ecosystems, and involve a transfer of potential value to a small number of large firms that generate few benefits for the people living in the north.



The failings of the approach under the Northern Development Program appear mostly derived from:

1. An unattenuated optimism bias that has generated severe over-estimation of the economic and social benefits of chosen investments.
2. Assumptions on impact pathways that are known to generate poor returns on investment and to fail to generate positive impacts for target cohorts of the population (e.g. Indigenous Australians).
3. Governance concerns associated with the use of intermediary-based development pathways that have a strong likelihood to be associated with capture of investment pathways by small numbers of non-target firms due to an avoidance of transparency and independent review in investment decisions.
4. A severe disregard for existing values associated with northern waterways and their potential to provide for alternative development pathways that would better achieve core objectives.

These factors appear to be associated with a willingness to make bold statements that are almost completely ignored in the actual development of programs associated with it. The White Paper, for example, is replete with statements regarding inclusion of the concerns of people living in northern Australia, of Indigenous Australians, of environmental sustainability and of preservation of the unique and highly sensitive landscapes of northern Australia. Yet there is no evidence of governance processes to support these statements, nor is there evidence to suggest that the chosen investment pathway, mainly associated with irrigation development of otherwise natural waterways, can support any of the objectives stated in the White Paper and other supporting policy documents.



While the stated development objectives of the NDP are commendable, ultimately the approach appears to be wildly misdirected; based on false assumptions; likely beset by governance issues associated with poor planning and understanding of intermediary-based impact programs; and is unlikely to achieve any of the aims that were used to rationalise its development in the first place.

The major source of *wastage* in water systems of northern Australia is thus not in their existence as natural rivers. Rather it is in the use of public funds to support water extraction projects that have no reasonable expectation of delivering either a financial or social return to people living in northern Australia while being detrimental to northern Australian ecosystems and natural assets.

## RECOMMENDATIONS

1. **The Australian Government's proposed refresh of 'Our North, Our Future' White Paper should extend to a comprehensive review of the Northern Development Program,** including key funding mechanisms such as the Northern Australia Infrastructure Fund (NAIF) and National Water Infrastructure Development Fund (NWIDF), with a focus on:
  - a. Valuing and maintaining assets (natural, social, cultural, physical, and human) that support current wellbeing in northern Australia;
  - b. Ensuring evidence based development and program pathways.
  - c. Consultation with northern Australian communities, in particular with Indigenous Australians;
2. For all future project assessments, implement a formal and mandatory review process designed to address optimism bias in irrigation projects. These processes should:
  - a. Use proven frameworks, such as the Reference Case Analysis framework as a basis for project benefit review and create independent review mechanisms to avoid regulatory capture of the funding agency;
  - b. Ensure transparency measures are implemented to enable public scrutiny and independent review of investments.

# KEY TERMS

**Anchoring Bias:**

Anchoring bias occurs when decision-makers fixate on initial forecasts and expectations and subsequently face difficulty adjusting (Kahneman and Tversky 1979).

**Northern Development Program (NDP):**

The suite of policies, investment vehicles and programs that derive from the White Paper (see below) and associated documents/policy positions.

**Intermediary-based delivery mechanism:**

An approach to program delivery that seeks to use intermediaries rather than to act directly to achieve target outcomes.

**Optimism Bias:**

Optimism bias derives from a combination of cognitive biases that produce overestimation (delusion) and strategic misinterpretation due to inconsistent incentives (deception) (Flyvbjerg 2009)

**Regulator-Intermediary-Target (RIT) model:**

The *Regulator-Intermediary-Target* (RIT) model is a recent extension of traditional views of regulation (involving only Regulators and Targets) to include *regulatory-intermediaries* and to broaden the applicability of regulatory governance models to contexts that entail less formal *regulation* and more *collaboration* in achievement of objectives (Abbot *et al.* 2017b)

**White Paper:**

Australian Government 2015. *Our North, Our Future: White Paper on Developing Northern Australia*. Commonwealth of Australia, Canberra.





# REFERENCES

Abbott, K., Levi-Faur, D. and Snidal, D. 2017. 'Introducing regulatory intermediaries'. *American Academy of Political and Social Science*, 670: 6-13.

Adept Economics, 2020. 'Economic Costs of Inaction on Paradise Dam'. A report prepared for Bundaberg Regional Council, Wide Bay Burnett Regional Organisation of Councils, Regional Development Australia Wide Bay Burnett, Bundaberg CANEGROWERS, CANEGROWERS Isis, and Bundaberg Fruit and Vegetable Growers

Ansar, A., Flyvbjerg, B., Budzier, A. and Lunn, D. 2014. 'Should we build more large dams? The actual costs of hydropower megaproject development'. *Energy policy*, 69: 43-56.

Ash, A. and Watson, I. 2018. 'Developing the north: learning from the past to guide future plans and policies'. *The Rangeland Journal*, 40: 301-314.

Ash, A., Gleeson, T., Hall, M., Higgins, A., Hopwood, G., MacLeod, N., Paini, D., Poulton, P., Prestwidge, D., Webster, T. and Wilson, P. 2017. 'Irrigated agricultural development in northern Australia: Value-chain challenges and opportunities'. *Agricultural Systems*, 155: 116-125.

Auditor General of Western Australia 2016. 'Ord-East Kimberley Development'. <https://audit.wa.gov.au/reports-and-publications/reports/ord-east-kimberley-development/auditor-generals-overview/>.

Australian Bureau of Statistics 2022a. 'Labour Force, Australia, Detailed - Table 05. Employed persons by State, Territory and Industry division of main job (ANZSIC)'. <<https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release>>, accessed 05 May 2022.

Australian Bureau of Statistics 2022b. 'Labour Force, Australia, Detailed - Table 02. Labour force status by State, Territory, Greater capital city, Rest of state (ASGS) and Sex'. <<https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release>>, accessed 05 May 2022.

Australian Bureau of Statistics 2022c. 'Labour Force, Australia, Detailed - UQ2b Unemployed persons by Industry division of last job (ANZSIC), State and Territory, February 1991 onwards'. <<https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release>>, accessed 05 May 2022.

Australian Government 2015. 'Our North, Our Future: White Paper on Developing Northern Australia'. Commonwealth of Australia, Canberra.

Bowen Collinsville Enterprise Inc 2019. 'Urannah Water Scheme preliminary business case'. Available from <https://bowenriverutilities.com/wp-content/uploads/2019/11/UrannahDampreliminarybusinesscase-mainreport.pdf> (accessed 10 June 2022).

Building Queensland 2019. 'Nullinga dam and Mareeba Dimbulah Water Supply Scheme Improvements business case/cost benefit analysis summary'. Available from [https://www.statedevelopment.qld.gov.au/\\_data/assets/pdf\\_file/0024/54456/Nullinga\\_Dam\\_CBA\\_Summary.pdf](https://www.statedevelopment.qld.gov.au/_data/assets/pdf_file/0024/54456/Nullinga_Dam_CBA_Summary.pdf) (accessed 10 June 2022).

Building Queensland 2017. 'Nullinga Dam and other options preliminary business case'. Available from: [https://www.statedevelopment.qld.gov.au/\\_data/assets/pdf\\_file/0020/54542/Preliminary-Business-Case-Nullinga-Dam-and-Other-Options.pdf](https://www.statedevelopment.qld.gov.au/_data/assets/pdf_file/0020/54542/Preliminary-Business-Case-Nullinga-Dam-and-Other-Options.pdf) (accessed 10 June 2022).

Davidson, B.R. 1965. 'The Northern myth. A study of the physical and economic limits to agricultural and pastoral development in tropical Australia'. Melbourne University Press: Melbourne, Australia.

Department of Environment, Parks and Water Security Northern Territory 2021. 'Singleton Horticulture Project'. Available from <https://depws.nt.gov.au/land-resource-management/development-coordination/project/singleton-horticulture-project> (accessed 09 June 2022).

Department of Infrastructure and Regional Development 2017. 'Cost Estimation Guidance – Guidance Note 2 “Base Cost Estimation”’.

Department of Primary Industries and Regional Development Western Australia 2022. 'Ord River Irrigation Expansion Stage 3: Cockatoo Sands, Western Australia'. Available from <https://www.agric.wa.gov.au/measuring-and-assessing-soils/ord-river-irrigation-expansion-stage-3-cockatoo-sands-western> (accessed 09 June 2022).

EDO 2021. 'In the matter of the referral of the review of a water extraction licence decision to the Water Resources Review Panel under Section 30 of the Water Act (19932)'. Environmental Defenders Office (EDO) submission to the Water Resources Review Panel on behalf of two client organisations, namely the Arid Lands Environment Centre (ALEC) and the Environment Centre NT (ECNT).

EM Pty Ltd and SMEC Australia 2018. 'Burdekin Falls Dam Raising feasibility report'.

Ernst and Young 2020. 'Seasonal horticulture labour demand and workforce study'. Report prepared for Horticulture Innovation Australia. [https://ausveg.com.au/app/uploads/2020/10/20200928\\_Hort-Innovation\\_Workforce-study\\_Final-Report\\_Public-Extract\\_vF2.pdf](https://ausveg.com.au/app/uploads/2020/10/20200928_Hort-Innovation_Workforce-study_Final-Report_Public-Extract_vF2.pdf).

Fitzgerald R. 2022. 'Roper River will 'disappear', traditional owners say, as government considers massive water allocation'. ABC Katherine, NT, Available from - <https://www.abc.net.au/news/2022-02-08/indigenous-owners-call-for-nt-government-to-reject-water-licence/100812012> (accessed 09 June 2022).

Flyvbjerg, B. 2007. Policy and planning for large-infrastructure projects: problems, causes, cures. *Environment and Planning B: planning and design*, 34(4): 578-597.

Flyvbjerg, B. 2008. Curbing optimism bias and strategic misrepresentation in planning: Reference class forecasting in practice. *European planning studies*, 16(1): 3-21.

Flyvbjerg, B., Ansar, A., Budzier, A., Buhl, S., Cantarelli, C., Garbuio, M., Glenting, C., Holm, M.S., Lovallo, D., Lunn, D. and Molin, E. 2018. Five things you should know about cost overrun. *Transportation Research Part A: Policy and Practice*, 118: 174-190.

Flyvbjerg, B., Garbuio, M. and Lovallo, D. 2009. Delusion and deception in large infrastructure projects: two models for explaining and preventing executive disaster. *California management review*, 51(2): 170-194.

Flyvbjerg, B., Skamris Holm, M.K. and Buhl, S.L. 2005. How (in) accurate are demand forecasts in public works projects?: The case of transportation. *Journal of the American planning association*, 71(2): 131-146.

Fortune Agribusiness, 2021. 'Singleton Horticulture Fact Sheet'. Available from <https://www.chambernt.com.au/documents/item/1246> (accessed 10 June 2022).

Garnett, S., Woinarski, J., Gerritson, R. and Duff, G. 2008. 'Future options for North Australia'. Charles Darwin University Press, Darwin.

Gretton, P. 2013. 'On input-output tables: uses and abuses'. Staff Research Note, Productivity Commission, Canberra.



- Head, L. 1999. The northern myth revisited? Aborigines, environment and agriculture in the Ord River Irrigation Scheme, Stages One and Two. *Australian Geographer*, 30(2): 141-158.
- Higginbottom, T.P., Adhikari, R., Dimova, R., Redicker, S. and Foster, T. 2021. Performance of large-scale irrigation projects in sub-Saharan Africa. *Nature Sustainability*, 4(6): 501-508.
- Howe, J., Clibborn, S., Reilly, A., van den Broek, D. and Wright, C.F. 2019. 'Towards a durable future: Tackling labour challenges in the Australian horticulture industry'. University of Adelaide, Australia.
- Infrastructure Australia, 2021. A National Study of Infrastructure Risk.
- Jackson, S. and Barber, M. 2016. Historical and contemporary waterscapes of North Australia: Indigenous attitudes to dams and water diversions. *Water History*, 8(4): 385-404.
- Jackson, S., Stoeckl, N., Straton, A. and Stanley, O. 2008. The changing value of Australian tropical rivers. *Geographical Research*, 46(3): 275-290.
- Jacobs Australia, 2019, *Cloncurry River Dam Detailed Business Case*.
- Kahneman, D. and Lovallo, D., 1993. Timid choices and bold forecasts: A cognitive perspective on risk taking. *Management science*, 39(1): 17-31.
- Kahneman, D., 1979. Prospect theory: An analysis of decisions under risk. *Econometrica*, 47: 278.
- Lovallo, D. and Kahneman, D., 2003. Delusions of success. *Harvard business review*, 81(7), 56-63.
- Megarrity, L. 2018. 'Northern dreams: The politics of northern development in Australia'. Australian Scholarly Publishing.
- NT Farmers Association, 2019. 'NT Plant Industries Workforce Development Plan 2020-25'. [https://ntrebound.nt.gov.au/\\_data/assets/pdf\\_file/0003/930027/5-NT-Farmers-WorkforceDevelopmentPlan2020\\_Final\\_Small-compressed.pdf](https://ntrebound.nt.gov.au/_data/assets/pdf_file/0003/930027/5-NT-Farmers-WorkforceDevelopmentPlan2020_Final_Small-compressed.pdf).
- Petheram C., Gallant J., Stone P., Wilson P., Read A. 2018, Rapid assessment of potential for development of large dams and irrigation across continental areas: application to northern Australia. *The Rangeland Journal* 40: 431-449.
- Petheram, C., McMahon, T.A. and Peel, M.C. 2008. Flow characteristics of rivers in northern Australia: implications for development. *Journal of Hydrology*, 357(1-2): 93-111.
- Productivity Commission, 2014. 'Public Infrastructure'. Inquiry Report No. 71, Canberra.
- Ruberl H, Ball M, Lucas L and Williamson T. 2021. 'Estimating the NAIRU in Australia'. Treasury Working Paper, The Treasury, Canberra, Australia.
- Saunders, M. and Denniss, R. 2022. 'Dam bad ideas – The lack of economic evidence for dam building in Australia'. Report by the Australia Institute, accessible at: <https://australiainstitute.org.au/wp-content/uploads/2022/04/P1242-Dam-bad-ideas-WEB.pdf>
- SMEC Australia, 2018. 'Hells Gates Dam Feasibility Study Final Feasibility Report – Chapter 3; Revision No. 02'.
- Stokes C, Addison J, Macintosh A, Jarvis D, Higgins A, Doshi A, Waschka M, Jones J, Wood A, Horner N, Barber M, Bruce C, Austin J and Lau J. 2017. 'Costs, benefits, institutional and social considerations for irrigation development'. A technical report to the Australian Government from the CSIRO Northern Australia Water Resource Assessment, part of the National Water Infrastructure Development Fund: Water Resource Assessments. CSIRO, Australia.

The State Government of Queensland (State Development, Infrastructure, Local Government and Planning), 2021. 'Nullinga Dam and Mareeba Dimbulah Water Supply Scheme Improvements'. Available from <https://www.statedevelopment.qld.gov.au/industry/infrastructure/completed-business-cases/nullinga-dam-and-mareeba-dimbulah-water-supply-scheme-improvements> (accessed 10 June 2022).

Touran, A. and Lopez, R. 2006. Modeling cost escalation in large infrastructure projects. *Journal of construction engineering and management*, 132(8): 853-860.

Warfe, D, Pettit, N, Davies, P, Pusey, B, Hamilton, S, Kennard, M, Townsend, S, Bayliss, P, Ward, D, Douglas, M, Burford, M, Finn, M, Bunn, S & Halliday, I. 2011, The 'wet-dry' in the wet-dry tropics drives river ecosystem structure and processes in northern Australia, *Freshwater Biology*, 56(11): 2169-2195.

Wittwer G and Banerjee O, 2014. Investing in irrigation development in North West Queensland, Australia. *Australian Journal of Agricultural and Resource Economics*, 59: 189–207





