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Assessment of the potential changes in wellbeing of key interest groups in the Fitzroy River catchment under alternative development scenarios: Traditional Owners' workshop

Report

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Summary

This report presents the preliminary results of a workshop held on 10 and 11 September 2019 with Traditional Owner groups in Fitzroy Crossing, aiming to develop a way to identify and assess the positive and negative effects of different future scenarios on the wellbeing of Traditional Owners across the Fitzroy River catchment. Participants discussed how several categories of wellbeing are currently satisfied in the Fitzroy catchment; and then assessed scenarios 1, 2 and 4 against those categories. Participants' ratings generally had scenario 1 with the most positive ratings, and scenarios 2 and 4 with mostly negative ratings. The negative ratings seem to be linked with an aversion to large-scale irrigated agriculture and its perceived potential impacts, especially the withdrawal of water, pollution, and limited access to country. Participants perceived positively an increase in ranger jobs and the potential for Indigenous owned enterprises in scenarios 1 and 2. However, many emphasised that making these jobs satisfactory required training initiatives to build Traditional Owners' capacity. Next steps include a more comprehensive analysis of participants' comments, reporting back to participants and to a broader audience.

1. Introduction – what this project was about and how we got here

The National Environmental Science Program (NESP) Northern Australia Environmental Resources Hub's project on multi-objective planning aims to help participants to collaboratively construct and assess the outcomes of alternative development scenarios (henceforth 'future scenarios'). The future scenarios used in this workshop were developed collaboratively by the scenario team in two workshops including key interest groups from the region.

During workshop 1 (July 2018, see Figure 1), the scenario team shared understandings of what is happening in the region that could shape the future development of the catchment. This included a discussion about the diverse views on development. Before exploring the future, the group looked back into the past. They created a timeline for the Fitzroy, identifying the events and forces that have shaped how the catchment looks today and could drive development in the future. A key activity of the workshop was to identify the main driving forces of land use change and development initiatives proposed for the catchment.

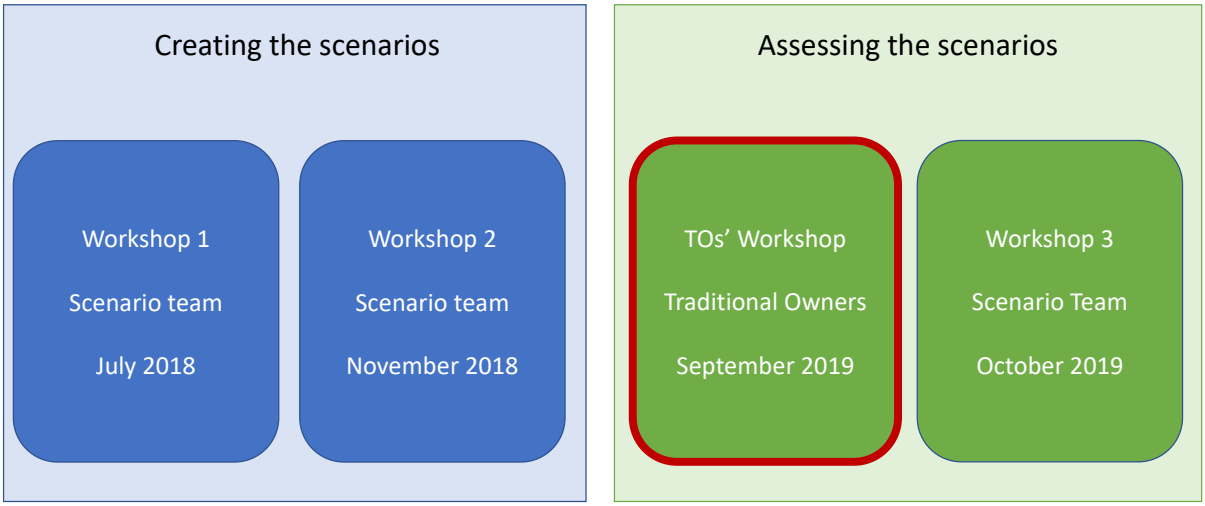


Figure 1. Participants and dates of each project workshop. The workshop reported here (TOs' workshop) is highlighted in red.

During workshop 2 (November 2018), the scenario team ranked the drivers listed during the first workshop to identify those with the highest potential to cause major land use changes in the region (i.e. most influential) and those that participants were most uncertain in terms of how they could shift development in the future (i.e. most uncertain). The group chose the six most influential and uncertain drivers to build the scenarios, using the top two, policies and markets (primary drivers), to describe the main differences among scenarios. Exploratory scenario development exercises, like this one, generally include four scenarios constructed along two primary drivers described as opposite poles. Therefore, the group agreed to use the primary drivers to build the logic of scenarios (Figure 2) and use the secondary drivers to describe further variations (see definitions of selected drivers in Appendix 1). Due to

differences in the scope and interpretation of the driver related to markets, the research team proposed a revised naming and definition for this driver (Appendix 1 and Figure 2), which the scenario team agreed to use in subsequent stages of the process. The outputs from the first two workshops include, for each future scenario, maps and a narrative describing changes in land and water use, and in biophysical and socioeconomic indicators.

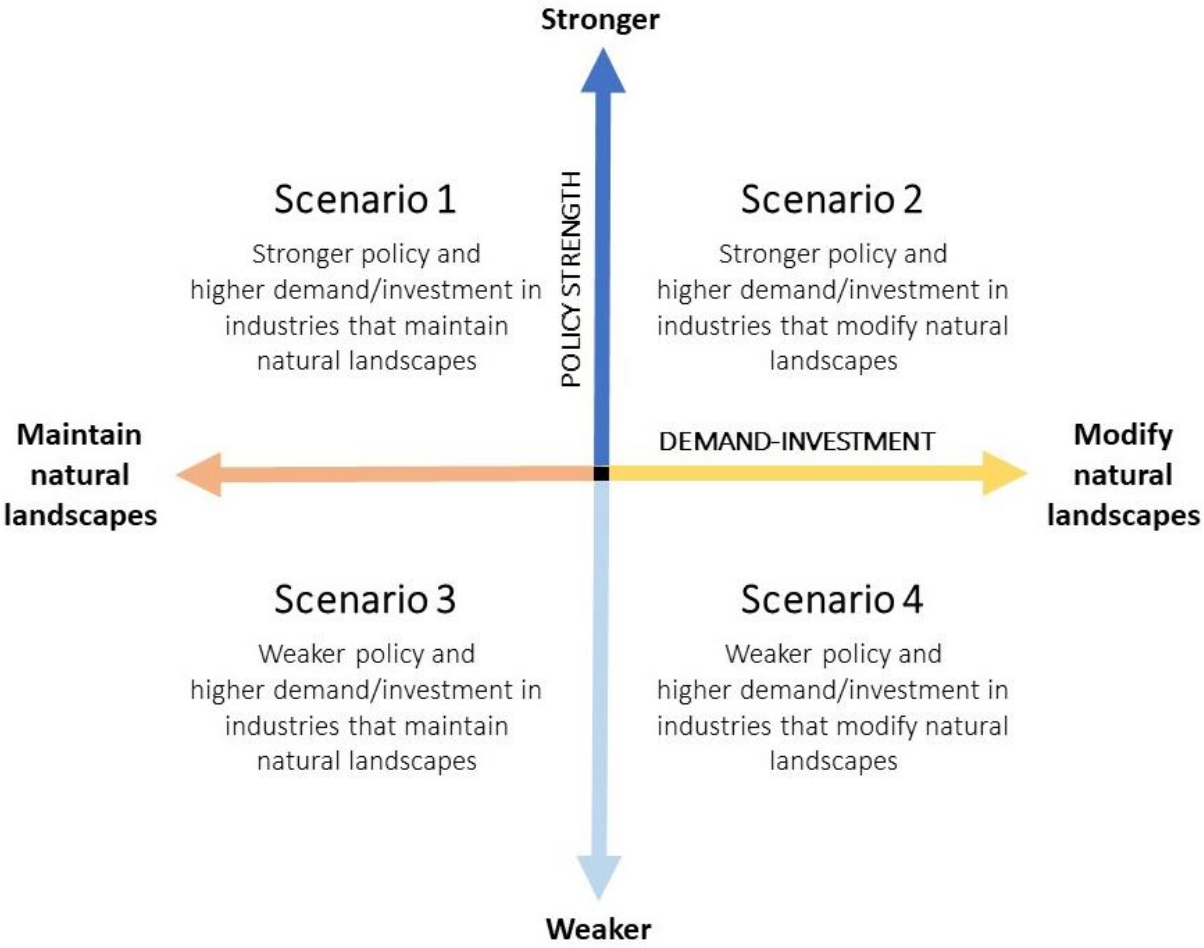


Figure 2. Four scenarios defined based on the two primary drivers.

1.1 Aim of the Traditional Owner workshop in Fitzroy Crossing

A workshop was held on 10 and 11 September 2019 with Traditional Owner groups in Fitzroy Crossing (henceforth 'TOs' workshop'; Figure 1), together with NESP project 5.4 (Showing and Sharing Knowledge in the Fitzroy River Catchment, led by Dr Rosemary Hill). The broad aim of the workshop was to develop a way to identify and assess the positive and negative effects of different future scenarios on the wellbeing of residents across the Fitzroy catchment. The question guiding the assessment of scenarios is:

> *How could changes associated with future scenarios affect (positively or negatively) the wellbeing of people who live in or have significant interests in the catchment?*

The specific goals of the workshop were to:

1. Develop a common language around wellbeing that can be used by different groups in the Fitzroy catchment. This can help, for example, future negotiations, planning and decision-making processes related to future land and water uses in the region.
2. Develop a shared understanding among participants of the ways in which people's wellbeing may be satisfied from the Fitzroy catchment today. Note that 'understanding' in this context does not mean 'agreement'.
3. Document, for each future scenario, the views of participants on how changes could affect the wellbeing of different interest groups.
4. Build on the above goals and the evaluations from participants, recommend a method (a 'way') to identify and assess the potential effects of future scenarios on the wellbeing of different social groups, as part of the 'toolkit' being developed through this project.

At the start of the workshop, the following points about *'scenarios and the scope of the scenario assessment'* were reiterated for participants:

- Scenarios are not about what should happen, they are about what could happen
- Scenarios do not represent the plans of any particular organisation/group; they combine ideas from everyone
- Scenarios are not alternative plans that we need to compare and choose from
- Scenario assessment is not about agreeing on which is the best or worse scenario
- Scenario assessment is not a social or environmental impact assessment
- This and previous workshops are not *de facto* consultation for ongoing planning initiatives in the region.

2. Context

There are around 7,000 people living in the Fitzroy catchment. The following were identified as key interest groups in the region:

- Aboriginal Australians (hereafter Traditional Owners)
- pastoralists
- environmental interests
- mining
- federal, state and local governments
- tourism.

In this project, Traditional Owners (TOs) and pastoralists residing in the catchment were considered primary interest groups because their interests and wellbeing will be most likely (and directly) affected by future land and water use changes in the catchment. We also acknowledge that Traditional Owners are subject to structural disadvantage, amplifying impacts of any changes in their wellbeing. For this reason, besides the workshop including different interest groups (workshop 3, Figure 1), it was decided to hold specific workshops to assess future scenarios with TOs (September 2019) and pastoralists (early 2020).

3. Method – what we did during the workshop

The assessment method has adapted elements of different participatory scenario development and evaluation methodologies, including Daw et al. (2015), Liswanti et al. (2017) and Mitchell et al. (2016). Developing the method took over a year of intense collaboration between NESP and other researchers.[1] This included work with an Aboriginal interpreter, Ms Olive Knight, to culturally translate the wellbeing factors used in the assessment. Four project participants, all related to Traditional Owners' interests, provided feedback on the method at a preliminary workshop (Derby, August 2019). The use of the Aboriginal language word 'Liyan'[2] to accompany wellbeing, for example, came out of this workshop. Below we describe the steps we took in the assessment.

3.1 Introduction and presentation on the catchment today

The workshops began with presentations on (1) the aim of the assessment, including an overview of proposed workshop activities and expected outputs from the workshop; and (2) how the scenarios were developed, including a description of the current situation in the catchment.

The descriptions of the current catchment situation included a summary of the overall land use (main industries) and broad socioeconomic conditions (e.g. in terms of policies and collaboration). The presentation used supporting information such as a map representing the current distribution of land uses, and broad selected biophysical and socioeconomic indicators describing key features of industries (e.g. type of development, used land surface, gross value, direct employment for Indigenous/non-Indigenous people, surface and groundwater use). This description of the current situation specified the baseline for scenario comparisons. It also provided the basis for exploring the definitions of the wellbeing categories (Table 1).

3.2 Definition of wellbeing categories and description of wellbeing from the catchment today

The wellbeing categories (Table 1) were presented using pictures and practical examples. The wellbeing categories provided a consistent structure for assessing future scenarios,

[1] The development of the method was led by Milena Kim in collaboration with Ken Wallace, Jorge Álvarez-Romero and David Pannell. Ro Hill, Natalie Stoeckl, Vanessa Adams, Olive Knight and Karen Dayman also provided invaluable feedback on the method. Michael Douglas contributed to the implementation stage.

[2] 'The Yawuru people are the native title holders of the land in and around Broome in the West Kimberley. *Mabu liyan* is a Yawuru concept that means 'strong spirit', 'good feeling' and 'positive wellbeing'. Personal to an individual and also connected to the wider community and country, *mabu liyan* is the heart of the Yawuru social development agenda.' [downloaded 27 August 2019 from: https://jawun.org.au/2019/03/building-a-future-of-strong-spirit-mabu-liyan/]. During the Derby workshop to test concepts and approach, 'liyan' was equated with 'wellbeing' by the Indigenous participants, and it was suggested that the two words be linked.

which in turn allowed the positive and negative effects of scenarios on different groups of people to be compared.

After the presentation of the wellbeing categories, participants selected a table with a facilitator to discuss a series of questions (Table 3) about how people satisfied their wellbeing from the catchment today. Table groups ranged in size from 4 to 6, and participants worked with these groups on all assessment activities. Each group discussed 2–3 of the categories. Facilitators captured responses on sticky notes, and then these were displayed on butchers' paper. A participant from each group then described the outputs in a plenary session, which included some discussion.

There was no rating of the current situation, only a narrative description of the above. The session was audio recorded (with the consent of participants). The information from groups on the wellbeing categories remained on display throughout the workshop so that participants could refer to and use the knowledge generated by all groups during the evaluation of scenarios.

Table 1. Definitions of the wellbeing-liyan categories for the scenario assessment. These are adapted from Wallace et al. (2020) with detailed re-wording and interpretation from Olive Knight (Aboriginal interpreter from the study region) and the Derby preliminary workshop participants.

Categories include having:	Description and example
Enough food and water to drink	Having enough food and drinking water. Having wood or power to cook food. Includes beef, fish, bushfood, and food from the supermarket.
Satisfying work	Work that makes you feel good. Includes paid, unpaid, full time, part time, and casual work.
Knowledge of country and culture	Knowledge that comes from country/nature and knowledge that comes from special places, such as dreamtime places, water places and historic sites such as station homesteads, cattle yards, and rock art.
Safety/security	1. Living in country where you are safe from: • Disease and injury • Feral animals, mosquitoes and their diseases • Poisonous and other dangerous plants and animals 2. Living in country where you are safe from people with altered behaviour (e.g. people affected by drugs and alcohol).
Healthy country and river	Having a good, comfortable environment where you are not too hot, not too cold. An environment where you are not affected by heavy dust, fire/smoke, or poisons like pesticides. Includes wood for warmth, clothes to wear, good houses and air conditioning, and shade from trees.
Fun – recreation, leisure	The happiness you get from having a good time. Includes recreation such as camping, fishing, boating, having a picnic.
Strong family and community relationships	Family fulfilment (contentment): includes belonging to a family (e.g. a kinship or skin group) that provides: • Harmonious and supportive relationships • Sense of family belonging • Some close friendships, not necessarily within the immediate kinship group. Community fulfilment (contentment): includes belonging to a group, or groups, that provide harmonious and supportive relationships at a group level. Leads to a sense of social belonging and influences self-respect and dignity.
Places and things that make you feel good	Having places or things that are beautiful; that you will never get sick of looking at; that you can look at day in and day out and you still like it. Affects all the senses – touch, taste, smell, hearing, seeing. Examples include a beautiful landscape, boomerang, painting; or the smell of plants and the ground after rain.
Inner peace, spiritual fulfilment	The peace you get from living a life that is in harmony with your beliefs and having a strong spiritual connection with your environment.

3.3 Rating of wellbeing changes in future scenarios

Participants were asked to select the groups of people and the places or general areas (hereafter 'places') they were thinking about when assessing the scenarios (to which they were given a series of options; Appendix 2).

Then, participants rated each scenario in terms of the potential positive and negative changes in each wellbeing category compared with the current situation in the catchment. The process followed for each scenario assessed was the following:

a. The scenario was described in a presentation that included maps, diagrams, and a description of key indicators (described above).
b. The question addressed for each wellbeing category was: "if this scenario happens, compared to the way things are now, you/your group's wellbeing-liyan for each of the following categories will be…" (see Figure 3 for how responses were recorded). Participants discussed, in their groups, the wellbeing changes they expected to occur if the scenario became true. The aim at this stage was to document changes, with underlying reasons, and to share ideas among the group. Conversations were audio-recorded with participants' approval.
c. Participants were asked to rate changes from 'much worse' to 'much better' with the option of 'no change' in comparison with the current situation using Figure 3.

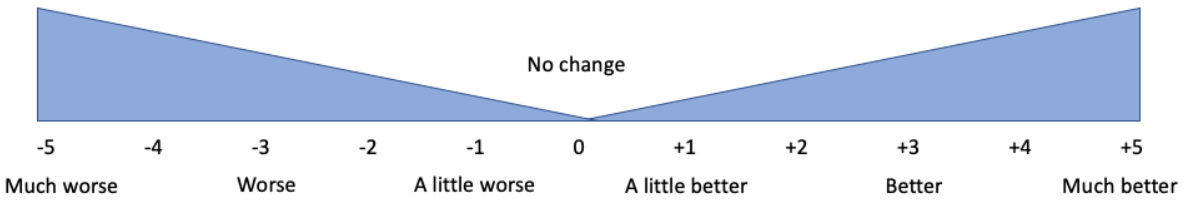


Figure 3: The 10-point scale used to rate the changes in each of the nine wellbeing categories for each scenario.

Participants could choose to remain anonymous when completing the worksheet. The discussion on step (b) was audio-recorded with the consent of participants. Facilitators took notes of the discussion. Participants could also include written notes in the worksheet explaining the rationale behind their ratings.

3.4 Statistical analyses of participants' ratings

To provide a broad overview of the participants' ratings the scores for each participant for each scenario were summed, taking into consideration whether the score was positive or negative. The scores for each participant were then added for each scenario – again taking into consideration whether the scores were positive or negative. The following calculations were then made:

a. total scores for each scenario
b. mean score per participant per scenario
c. median, standard deviation and range of scores for each scenario.

These calculations provide a useful, overall sense of participants' ratings and the variability among participants. However, these calculations assume that:

i. there is equal information among participants and responses are unaffected by any bias in the group situation
ii. all participants were thinking about the same area and people when making their assessments
iii. all participants equally understood the rating process.

It is clear from the People and Places results (Section 4.2 below) that assumption (ii), at least, does not hold. Additionally, the participants are experts, knowledgeable of their places and people; however, the quantitative results cannot be generalised as a representative sample of TOs in the catchment. Therefore, the summary statistics should be taken as broad indication of the whole group's responses and need to be used/interpreted together with the additional, qualitative information presented in the results. Together, the numerical and qualitative information provide an overview of the potential impacts on TOs' wellbeing associated with the land and water use changes presented in the scenarios. This overview is based on the knowledge of participants, who were selected based on their expertise of such matters.

4. Results

4.1 General workshop information

The workshop was attended by 23 participants from the Bunuba, Gooniyandi, Jaru, Kija, Yi-Martuwarra, Nyikina Mangala, Tiya Tiya, Warrwa, and Wanjina-Wunggurr peoples. There was a language interpreter (Mr Ronnie Jimbidie) and five researchers (Dr Jorge Álvarez-Romero, Dr Ro Hill, Mr Ken Wallace, Ms Karen Dayman, Dr Pia Harkness). Participants allocated themselves to four tables for group discussion. The resulting four tables had between 4 and 6 people from different Aboriginal groups, mostly divided by gender with a few exceptions. Scenarios 1,[3] 2 and 4 were assessed, in that order. There was insufficient time to assess scenario 3. The order was selected on the basis that they represented the most useful comparisons in terms of informing participants; in particular, they were contrasting.

[3] Scenario 1 in this workshop is equivalent to scenario 1A in the subsequent workshops.

4.2 People and places

Participants identified between 1 and 5 groups of people that they would be thinking about when assessing scenarios. The most frequently selected groups were ‘all TOs in the catchment’ (selected by 19 participants), ‘family group’ (12), ‘your TO group’ (9), and ‘community group’ (9) (Table 2). One participant included the ‘future generations and general population’.

Participants selected between 1 and 4 places they were thinking about when assessing scenarios. Most (18 participants) thought about the ‘river and its total catchment’, while 12 selected ‘river country’ and 8 selected ‘hill country’ (Table 2). Five participants selected ‘other places’, which included: Nyikina Mangala country; living waters inland; Jaru and Bunuba Ranges; all community along river + catchment + tributaries; Yurriurigum; Bayulu, Leopold, Brooking Spring, town.

Table 2. ‘People’ and ‘place’ selected by the TOs’ workshop participants. Participants could select more than one group of people and place.

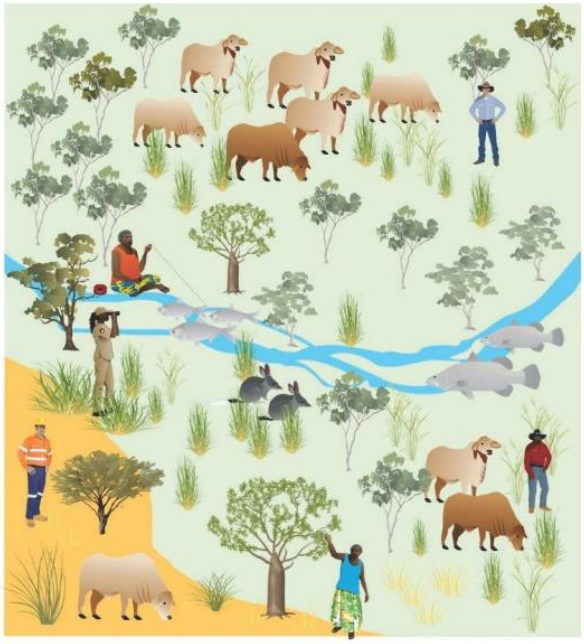
People	Total
All TOs in the catchment	19
Family group	12
Your TO group(s)	9
Community group	9
As an individual	2
Place	**Total**
River and its total catchment	18
River Country	12
Hill Country	8
Community group area(s)	6
Others	6
Desert Country	5
Particular station(s)	2

4.3 Current situation

Researchers presented an overview of the current state of the catchment, including the broad socioeconomic conditions and main industries (Box 1). Appendix 3 includes a map representing the current distribution of land uses and selected indicators describing key features of industries. As noted above, the group used the current situation to explore the definitions of the wellbeing categories and as the baseline to assess scenarios.

Box 1. Summary of current situation of the Fitzroy River catchment.

- Native title exists over 96% of the catchment, but there are some problems in access to country, including for recreation, subsistence, and cultural activities
- Overall, the regional visioning and objective setting in the catchment is fragmented among stakeholders, but there are opportunities for improved collaborative leadership and strengthening of Indigenous governance
- Existing policies protect local and national values (including those of national and international significance)
- Most enterprises in the catchment are based on industries that maintain natural vegetation
- Negotiations around development are not always seen as fair or taking place under equal conditions



- Land use dominated by grazing natural vegetation
- Cattle can access some sensitive areas and there is some level of overgrazing in others
- Some problems in access to country, including for recreation, subsistence, and cultural activities
- Some interest in investment in carbon farming using savanna burning (one new project registered)
- Parks, IPAs and private reserves of variable size, mainly in northern catchment (10% protected)
- Some cultural- and nature-based tourism on existing national/state Parks and private conservation areas
- No commercial aquaculture developments
- Small-scale resource extraction (low impact)
- Irrigated fodder within beef enterprises uses surface water extraction (6 GL, 0.12% of median discharge), small areas w/groundwater

Table 3. Wellbeing categories, questions addressed by the group and summary of participants' responses to the questions in the left column. Additional information that was not captured by the researchers' notes were added following review by workshop participants are within square brackets [], in italics.

Wellbeing category and question addressed by the workshop group	Summary of matters raised by participants
1. Enough food and water How do you get your food and water today?	*Water:* today when going out bush people source water from: ○ Drinking water from home/camp (bottled) ○ Clean sections of the river ○ Springs ○ Digging in the sand Use of bottled or other water from home/camp reflects both lack of water quantity due to low rainfall, and poor water quality due to: ○ Many rivers are polluted from cattle on the river (mainly) and to lesser extent by pigs; and ○ Erosion into wetland systems *Food:* main sources of food are: ○ Supermarket ○ Wetland systems ○ Hunting *[and collecting]* on country However, availability of food is affected by: ○ Poor water quality in some wetland systems as described above (affects fish, cherabin prawn, river turtles; and also other animals that prey on animals living in water) ○ Wrong way fire reduces the abundance of bush food and feed for animals that are important for hunting, such as bush turkey ○ Bush food seems to be less abundant because of climate change ○ Poor access to stations for hunting is a major, complex issue
2. Satisfying work, meaningful work What are your opportunities for meaningful work today?	Six key areas of meaningful work were identified: ○ *Pastoral/agricultural*: working on country (e.g. in stations) is an important and meaningful occupation ○ *Rangers*: working as rangers is a meaningful and important occupation today, but there are limited (and unreliable) resources (e.g. funding) to support ongoing ranger activities ○ *[Tourism: there is a growing interest in Indigenous, nature and science-based tourism dovetailing with pastoral, ranger and arts industry skills]* ○ *Arts*: the creation of art (e.g. paintings, carvings) is an important occupation today ○ *Mining*: participants identified working in mining as one possible occupation, but noted that many times jobs are taken by people from outside (mainly Fly-In-Fly-Out workers working in the industry) ○ *On-country programs*: Programs that support on-country training and provide opportunities to go to the bush are important and may provide meaningful occupation (e.g. activities led by Elders teaching younger people)

	Major issues and impediments in addition to those listed above are: ○ Working on art requires people going out/being on country because people create art about their country, their own dreamtime stories, spirits; people also need to obtain materials from country to create art (e.g. boomerangs); for these reasons having access to country is very important and currently there is constrained access (e.g. locked gates) ○ Ongoing increase in the use of technology for production could mean that less people will be needed, thus there could be less jobs than anticipated ○ Native title makes it harder for people to be hired, particularly in non-Indigenous stations (more people from outside the region are being hired instead) ○ Hiring people requires trust between employees and employer (currently weakened) ○ There seems to be less on-country work and more people depending on Centrelink ○ Insufficient/inappropriate training, which is needed to access available jobs ○ Getting harder to get people to work on stations (e.g. younger people seem less interested)
3. Knowledge of country and culture What ways can you connect to your country and culture today?	Important themes revolve around being on country and the connections through: ○ story telling ○ art, culture ○ language ○ relationships with country, whether through stories, skin-groups or customary law – and these are all important aspects of knowledge ○ Rainbow serpent/living water ○ Songs, dancing, corroboree ○ Sacred sites ○ Historic sites
4. A feeling of safety [safety, feeling safe and secure] What are the things that make you feel safe or not safe on your country today?	Feeling safe is facilitated by: ○ The Rainbow serpent ○ Family ○ Liyan, makes you feel safe, gives you a warning sign … [when we]…feel it [a danger]… Sixth sense… ○ Feeling of being safe on country ○ Healing from country ○ Driving safely ○ Housing makes you feel safe, having your own space, control of your own space, who comes and goes ○ Clean communities with houses in good state (e.g. not smashed glass) ○ Community solidarity for FASD, working together Not feeling safe relates to: ○ Locked gates and people who keep you out of country ○ Pastoral, station mob, don't make you feel safe ○ People trying to make money from our country ○ Living waters dropping

	○ If we have no river, we don't feel safe ○ People cannot get to places because trees are grown over ○ Climate change, seeing country and water quality change, appearance of jellyfish in water ○ Mining, coming over our ridge.
5. Fun – recreation, leisure What sorts of things do you do to have fun today?	Started with family and community, people talked about bush camps etc as important opportunities for connecting with family, practicing cultural and traditional activities, intergenerational teaching and learning knowledge. However, the conversation kept coming back to restrictions on the ability to continue these activities, e.g. lack of access to country (locked gates), dry/damaged river and ecosystems, waiting for externally driven opportunities (e.g. bush meetings). Changing the conversation to fun/leisure brought out more positive responses in terms of people's relationships to country. What country gives them. [Items discussed and listed – see Appendix 4 – are relevant to one or more of categories 3, 4, 6, or 7.]
6. Strong family and community relationships What are the ways that you connect to your family and community today?	Major themes were: ○ Camping and fishing, family catch-ups, which could be just family, or aligned with bush meetings arranged by an organisation, e.g. land council or ranger group meetings ○ Connection to country maintains cultural links to country, identity, family, past and future, ancestors — Taking family to country, teaching and learning culture on country — Creating memories – fostering cultural identity and connection ○ Connection to country, visiting special/important places – links to the country that sustains your ancestors and will sustain future generations ○ Sense of responsibility for country, culture, and future generations Enacting these themes is detrimentally affected by: ○ Lack of access to country can prohibit activities which maintain cultural connection to country, family ○ Dry river prevents teaching and learning, passing on knowledge ○ People (family and community connections) are impacted when the river and country is damaged – whether by humans, animals, pollution etc
7. Healthy country, healthy river What are the things that are healthy and unhealthy about your country today?	Participants focused on threats to the health of country, with main areas of concern being: ○ *Wrong way fire:* participants identified 'wrong-way fire' as an important concern affecting the health of the country today. What is required is ensuring that fire happens at the right time, in the right way (e.g. protecting places and avoiding sensitive areas like riparian vegetation important to provide shade and maintain areas providing bushfood), and is done by the right people (i.e. Traditional Owners). ○ *Dust storms:* plains areas, particularly eroded areas and areas with little vegetation cover (e.g. due to mismanagement). This was of especial concern earlier (e.g. 1960s and 1970s), but could become a problem again today; also related to wrong way fire that leaves country exposed

	○ *Dirty river*: people are concerned about the amount of rubbish left behind by people visiting the river, which affects the way people enjoy and use the river today ○ *Overfishing*: people are concerned about some people taking too many fish or catching big fish (e.g. taking big barramundi, breeders, before laying their eggs) because it will affect others taking their fish; this has become more problematic because lower water levels decrease habitat for fish, which also makes it easier for people to overfish
8. Places and things that make you feel good [aesthetics] Are there special places and things that make you feel good when you see, touch, taste, smell, or feel them?	This category was not one the workshop group related to, with the only comment being that the country 'looks beautiful'.
9. Inner peace, spiritual fulfilment How do you keep your Liyan strong today?	Points raised by the participants could be summarised as concerning connection of knowledge/language, and care/communication, down the river, and connection to inner peace, spiritual fulfilment. Points raised included: ○ Going back to the early days when all language groups existed together provided connection and everyone shared/cared, with access protocols to country along the river being very clear ○ There are important sites along the river, and particular people knew the songs for these sites and sang the songs to maintain the river ○ Sand is good for sleeping, camping, stories and connection to the land. Camping in river on sand with family/community, under the milky way, was an opportunity for old people to pass knowledge down to the young people ○ Good feeling when you see the river rising and running – flooding; the living water still exists ○ Being at the river is healing, the river brings life to the Kimberley Threats to the above activities include: ○ Loss of language and connection between language groups affects the capacity of groups along the river to interact effectively ○ Sand is shifting, which is not so good for camping ○ Lack of big floods means that pools are not cleaned out, and pools get lost. Also, sand has been pushed into and filled some fishing holes Solutions suggested included that: ○ Language should be taught to children in schools ○ A survival and leadership program for children was needed to pass on knowledge ○ A good approach would be to involve young ones in taking tourists along the river, sharing knowledge with others ○ River dancing should be maintained, '*That's what kept it alive'* a way of connecting with country

The description of how the wellbeing factors are currently satisfied in the catchment (i.e. the current situation) by participants is important because (1) it provides concrete meaning for each wellbeing factor used when assessing future scenarios, and (2) all the scenarios are compared with the current situation during the assessment, that is, the scores for each scenario may be directly compared given that they are all rated against a consistent baseline. In addition, discussions among the workshop group should encourage sharing of information and ideas, thus contributing to both group knowledge as a whole, and to information symmetry among the group. Ideally, this leads to more informed assessments and a valuable learning experience for all involved, whether as participants or facilitators/researchers.

The full outputs from each of the workshop groups are described in Appendix 4. The main topics raised by participants are summarised in Table 3. Generally, the topics have been separated into those that relate to the benefits derived from the catchment, and impediments to those benefits being achieved. Table 3 is a very comprehensive set of data that encompasses not only ways in which wellbeing is fulfilled, but also some of the major concerns of the group. The rich diversity of elements[4] in the catchment supports an equally rich set of interactions with the TOs. 'Fun/leisure' and 'beautiful things', as presented by the researchers, were not, based on the group discussions, seen as aspects of wellbeing that participants could easily relate to. This underlines the importance of developing wellbeing concepts that are culturally appropriate – in particular, these two categories require further consideration and development.

4.4 Scenario assessment

Scenarios 1, 2 and 4 were presented, discussed and assessed during the workshop; quantitative responses were provided by 21, 19, and 16 respondents, respectively. This drop off in numbers probably reflects that, for many, scenario 4 was mostly unacceptable. Also, several participants were feeling tired at the end of the workshop. Some participants expressed concerns that the scenarios seemed to be broadly grounded in an old pro-development paradigm based on agriculture and mining, with limited room for new and emerging industries and development models. They also mentioned that none of the scenarios represented an Indigenous view of a positive future and future possibilities. This is possibly a result of the project focus on developing realistic, rather than aspirational scenario development.

[4] Elements are taken here to include all the concrete 'things' in the catchment, both 'living' and 'non-living'. In many cultures what, from a Western viewpoint, might be considered non-living, may well be considered 'living' by Indigenous people. A case in point is the river, which was emphasised as being a living entity on a number of occasions by TOs.

Table 4. Descriptive statistics summarising the ratings of scenarios.

	Scenario 1	Scenario 2	Scenario 4
Total score	31	-245.5	-474
No. participants	21	19	16
Mean/participant	1.48	-12.92	-29.63
Median	0	-9	-28.25
Std deviation	16.73	13.24	14.24
Range	-26 to 36	-14.5 to 3	0 to -45

Table 4 summarises participants' ratings of scenarios. Given the assumptions and related comments described in Section 3.4 above, it is important that the statistics in Table 4 are taken as only broadly indicative of TO views.

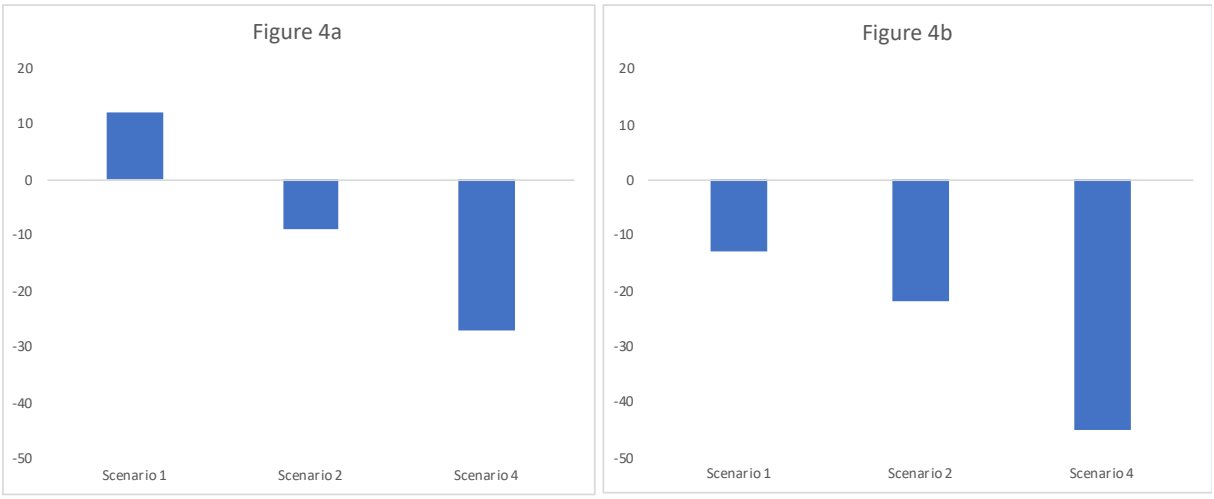


Figure 4. Sum of all positive and negative scores for scenarios 1, 2 and 4 for two workshop participants. Figures 4a and 4b together represent the patterns in more than half the rating responses.

Nevertheless, it seems reasonable to make three points:

i. The high level of returns and use of the wellbeing categories suggest that the assessment process has been well understood and managed by the TOs despite their comparatively brief exposure to the underlying concepts and approach;
ii. In general, the preferences among the scenarios are clear – although it is important that the issues listed under Section 3.4 are taken into consideration; and
iii. Despite the clear preferences, there is considerable differences within the workshop group, which is consistent with similar group responses elsewhere (see, e.g. Wallace et al. 2016). Broadly, most responses fall into one of the two patterns shown in Figure 4a and Figure 1b. The range of scores for any one scenario and the standard deviations (Table 4) confirm that there is a wide range of views within the broadly consistent pattern.

The qualitative information in the sections below, and summarised in Table 5, was sourced mainly from facilitators' notes and participants' written comments in the worksheets.

Table 5. Wellbeing categories most likely to improve and most likely to become worse per scenario and summary of associated comments.

Scenarios	1	2	4
Wellbeing categories most likely improved	Knowledge of country and culture: - young people going out to country could improve their knowledge of country and culture	Knowledge of country and culture: - increase in jobs in parks could improve TOs' knowledge	Knowledge of country and culture (based on a single score) (no positive comments)
	Satisfying work: - additional jobs, especially rangers - less dependency on CDP	Strong family and community: - more money might bring infrastructure, and social facilities that benefit communities	Inner peace, spiritual fulfilment (based on a single score) (no positive comments)
	Having fun: - better partnerships between Indigenous people and landholders	Satisfying work: - potential for Indigenous owned agricultural enterprises	Not applicable
Wellbeing categories most likely to become worse	Healthy river country: - withdrawal of water would impact the river - contamination by pests and weeds	Healthy river country: - intensification of agriculture leading to water contamination and scarcity	Satisfying work: - less ranger jobs - uncertainty regarding the sufficiency of these jobs and who would get them
	Inner peace and spiritual fulfilment: - limited access to country	Safety: - no change to the current unsafety due to social issues - outside workers worsening social issues - fear of bushfood contamination	Healthy river country: - if TOs are not allowed to go to country, then country won't be healthy - poor governance means less collective action to solve problems e.g. rubbish
	Enough food and water: - increased burning could mean loss of bushfood	Inner peace and spiritual fulfilment: - limited access to country - water extraction, pollution, weeds	Safety: (no comments)

4.4.1 Scenario 1

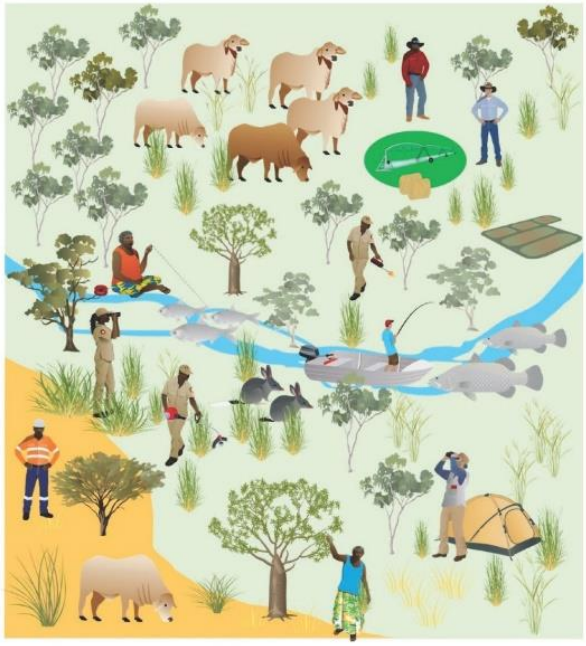
Researchers presented an overview of scenario 1, including the broad socioeconomic conditions and main industries (Box 2). Appendix 3 includes a map representing the potential distribution of land uses in 2050 and selected indicators describing key features of industries.

Some participants felt that this scenario presented positive changes, especially in relation to access to country; in some cases, unlocked gates would mean more opportunities to go fishing, hunting, camping, etc. However, others expressed concerns that this, as with the other scenarios, provided limited scope for TOs aspirations in relation to development in the catchment.

Participants' ratings show that 'knowledge of country and culture', 'satisfying work' and 'having fun' would improve the most, as compared with today, if scenario 1 came true (Figure 5). Some participants thought that this scenario could mean a lot of young people going out to country, and getting out of town. This could improve their knowledge of country and culture.

Box 2. Summary of the potential conditions in the Fitzroy River catchment under scenario 1.

- Stronger policies protect local and national values (including those of national and international significance) and give certainty; also, strong collaborative leadership (coordinated decisions) and strong Indigenous governance (Indigenous empowerment and participation, recognized by other stakeholders) enable better planning and management
- Higher demand and investment in development initiatives that maintain natural-cultural landscapes
- Negotiations around development are more fair and take place under equal conditions
- Evidence-based decisions and monitoring allow identifying changes and adjusting uses accordingly



- Land use dominated by grazing natural vegetation
- Better land and water management, including cattle control and reduced overgrazing
- Better access to country, including for recreation, subsistence, and cultural activities
- Good investment and extensive carbon farming using savanna burning (high carbon price)
- Large increase in the number and extent of new conservation areas (17%), managed through joint management
- Large increase (200%) in cultural- and nature-based tourism (85% Indigenous businesses)
- One new small-scale coastal barramundi farm
- Similar level of resource extraction (low impact)
- Six new medium-scale irrigated agriculture based on groundwater (100 GL, 2.9% of recharge)

Regarding 'satisfying work', some participants praised the additional jobs under this scenario. There could be, for example, less dependency on welfare programs. Nevertheless, an increase in jobs could also mean more people moving into towns. New national parks

would mean more rangers, which was considered as desirable to some groups. However, consistency of funding is essential. Rangers would need to have paid courses between other work so that they are consistently employed. Cultural activities should be associated with employment programs, but those would need to be in addition to rangers' work. This will also improve the knowledge of country and culture.

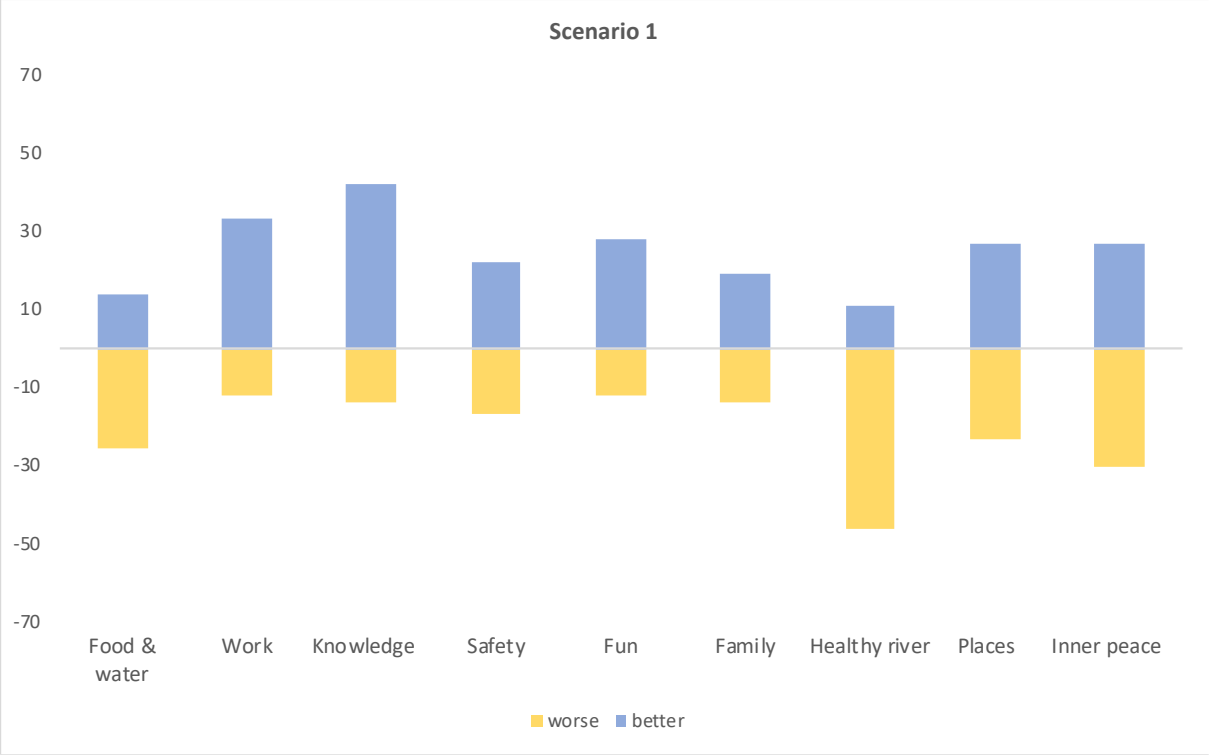


Figure 5. Scenario 1. Sum of the positive ('better') and negative ('worse') ratings per wellbeing category. Comparisons are with the current situation.

'Having fun' was sometimes associated with going fishing or camping, in special places, with family and friends. Thus, access to country and special places is very important. While some participants thought that there would be generally better partnerships between Indigenous people and landholders, others considered that access to their special places could be lost, for example to new tourist enterprises, thus affecting opportunities to have fun. One participant also mentioned that more '9 to 5' jobs would also make it more difficult for people to go out to bush and have fun. Another important point was the negative association between the current notions of 'fun', like playing football, drinking and socialising, especially because they compete with a more desirable idea of fun such as going to the bush. Some participants said that this scenario did not seem to affect people's opportunity to drink or socialise, and this would mean no improvement of these issues. Other participants thought that more money circulating due to the increase in jobs could actually amplify these issues since it could be spent on alcohol or other undesirable social activities.

The most negatively-rated categories, i.e. those where most participants saw potential for worsening as compared with today, were 'healthy river country', 'inner peace and spiritual fulfilment', and 'enough food and water'. The concerns regarding 'healthy river country' were

associated with the withdrawal of water (Figure 5). As a participant puts it, even if only ground water was used, all living water is connected and thus it would impact the river. Another source of concern was contamination by pests and weeds such as toads and buffel grass, which could be related to land use intensification.

Participants' concerns regarding 'inner peace' were mostly linked to their access to country. People need to have access to country in order for their Liyan to be good, and depending on where development happens this could mean the loss of access to important areas. There were few comments regarding 'enough food and water' but these were mostly related to the increase in carbon farming and the associated burning of country. Despite good fire management, a single bad fire can change some areas notably, which could mean the loss of bush food completely for large areas.

The category with the highest number of 'no change' ratings was 'places and things that make you feel good' (4 ratings).

4.4.2 Scenario 2

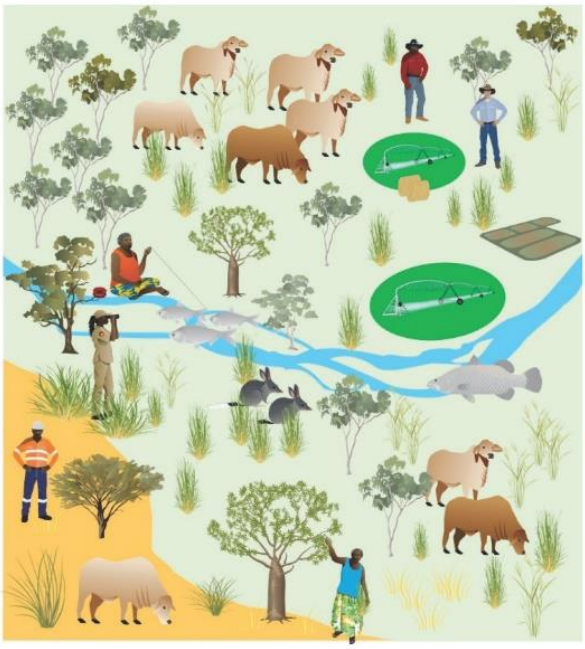
Researchers presented an overview of scenario 2, including the broad socioeconomic conditions and main industries (Box 3). Appendix 3 includes a map representing the potential distribution of land uses in 2050 and selected indicators describing key features of industries.

There was a general concern, reported in all groups of participants, regarding the relatively high level of irrigated agriculture development in this scenario. Extensive areas of agriculture were not viewed favourably, and this seemed to cut across all wellbeing categories. Some participants worried about the high level of uncertainty regarding the impacts of agriculture, while others referred to the historical impacts of development (e.g. weeds and water pollution) in the region. An increase in agriculture could also mean limited access to country, which would in turn affect connection to country and continuation of culture with consequent impacts on wellbeing.

There were also concerns specific to water being withdrawn from either the river or aquifers. Participants in one group emphasised that water is deemed the source of life for everybody and everything, and the river is considered a living being, having its own right to life. Participants described the current scarcity of water; for example, when going out on trips for collecting medicine plants they have to carry water because there is limited water available in the environment, negatively impacting on their ability to go on country and keep their connection to country strong.

Box 3. Summary of the potential conditions in the Fitzroy River catchment under scenario 2.

- Stronger policies protect local and national values (including those of national and international significance) and give certainty; also, strong collaborative leadership (coordinated decisions) and strong Indigenous governance (Indigenous empowerment and participation, recognized by other stakeholders) enable better planning and management
- Higher demand and investment in development initiatives that modify natural-cultural landscapes
- Negotiations around development are more fair and take place under equal conditions
- Evidence-based decisions and monitoring allow identifying changes and adjusting uses accordingly



- Land use dominated by grazing natural vegetation
- Better land and water management, including cattle control and reduced overgrazing
- Better access to country, including for recreation, subsistence, and cultural activities
- Medium-level investment in carbon farming using savanna burning (low carbon price)
- Medium increase in the number and extent of new conservation areas (13%), incl. joint management
- Medium increase (150%) in cultural- and nature-based tourism (75% indigenous businesses)
- Two new small-scale coastal barramundi farms
- Medium increase in resource extraction (low impact)
- 12,000 ha of irrigated rotation system (groundwater: 120 GL, 3.4% of recharge) & 18,000 ha of Rhodes grass (300 GL, 6.1% of median discharge)

They feared that an intensification of irrigated agriculture would worsen this situation and significantly affect their wellbeing. As a participant stated,

> *'I feel like I'm approving a gravitational pull to sterile country. Like I can look out the plane window to a patchwork country. Looking to a future like the Murray Darling'* (participant's name).

Participants also considered that an increase in tourism would not necessarily be desirable. At times, tourists want information about things they are not allowed to know, or they may try to access sacred and important sites that should not be visited.

Participant ratings showed some potential improvements in a few aspects of their wellbeing, especially 'knowledge of country and culture', 'strong family and community', and 'satisfying work' (Figure 6). 'Satisfying work' was also the category that received the most 'no change' ratings (6). Note, however, that overall, negative changes are assessed as outweighing positive changes for each category.

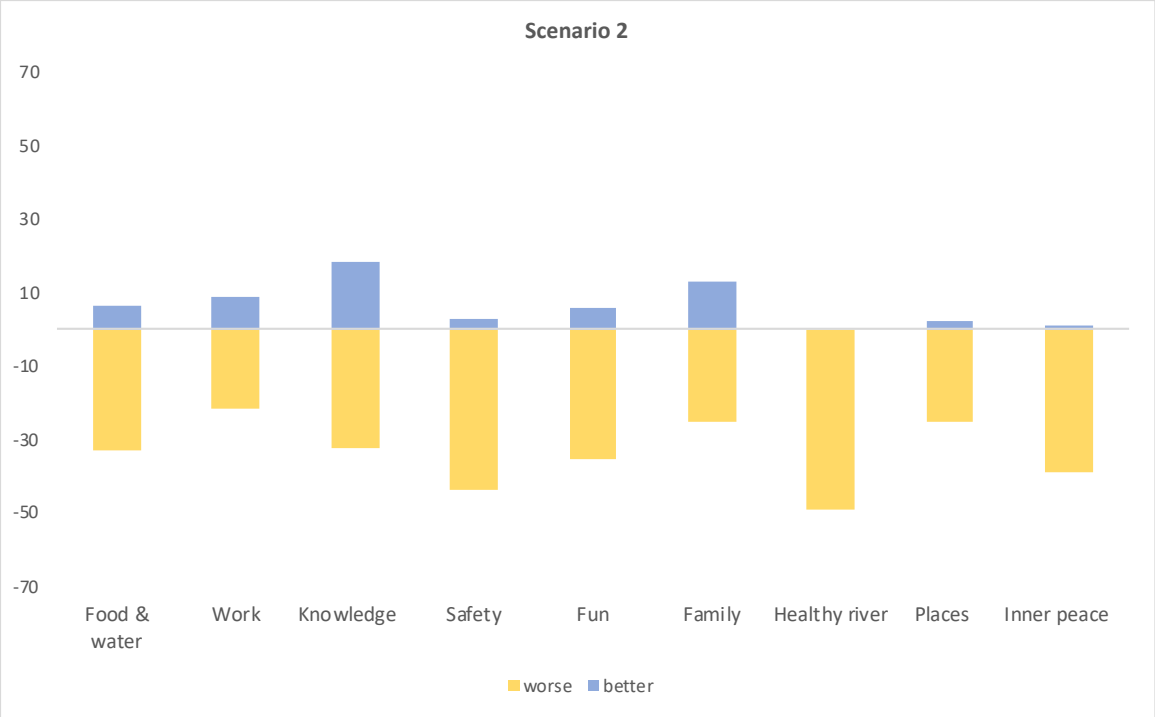


Figure 6. Scenario 2. Sum of the positive ('better') and negative ('worse') ratings per wellbeing category. Comparisons are with the current situation.

A participant thought that the increase in jobs in parks could improve TOs' knowledge of country and culture; however, the additional jobs in tourism may not significantly increase knowledge of country for local communities (beyond those that are directly involved in those jobs). A group of participants felt that knowledge of country and culture, as well as other aspects of TOs' wellbeing, would worsen because of the uncertain effects of more extensive agriculture and related changes to river. Others considered that their inability to practice cultural awareness could negatively affect knowledge of country.

Regarding family and community relationships, some female participants considered that more money might bring more roads, infrastructure, houses, health centres, which would benefit communities. However, more money and the way it is distributed can also cause arguments and increase conflict.

Despite the positive ratings for 'satisfying work', many participants questioned whether the additional jobs presented in this scenario would actually be fulfilled by Indigenous people. A group of participants viewed positively the potential for Indigenous owned agricultural enterprises, but they questioned whether and how the skills to run such enterprises would be developed. They also had reservations regarding the compatibility between Indigenous people managing or working in large-scale agriculture and continuing to meet cultural obligations, practicing cultural activities, and passing knowledge on. Some perceived that this scenario had increased jobs for people on country but also pollution in the river, and they questioned how these things could be balanced.

The categories perceived as potentially being most negatively impacted were 'healthy river country', 'safety', and 'inner peace, spiritual fulfilment' (Figure 6). Most groups suggested that the health of river country has already been affected by agriculture, for example water

pollution by chemical runoff. Participants were concerned that the intensification of agriculture could have negative impacts on drinking water from soaks in the river. Soaks are an important water source when the river runs dry. They were also worried about contamination of the aquifer and the lack of water due to extraction mentioned previously.

Participants in both a male and a female group described feeling unsafe today due to social issues, and they stated that scenario 2 provides no indication that people would feel safer in that situation. Conversely, people would be frightened to get bushfood because it could be contaminated. Additionally, the intensification of agriculture could bring more outside workers, which are normally men, who could bring negative experiences (e.g. looking for grog and women). Similarly, the issues related to water extraction, pollution, weeds and specially access to country were associated with negative effects in TOs' inner peace and spiritual fulfillment.

4.4.3 Scenario 4

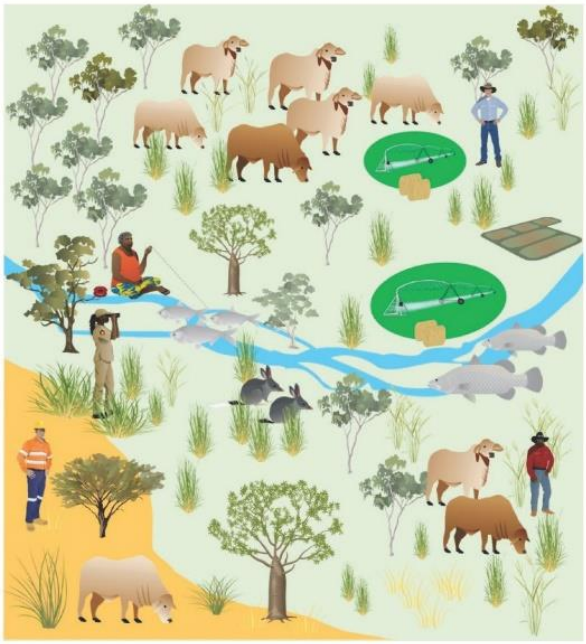
Researchers presented an overview of scenario 4, including the broad socioeconomic conditions and main industries (Box 4). Appendix 3 includes a map representing the potential distribution of land uses in 2050 and selected indicators describing key features of industries.

This scenario had the least participants rating it, and the least positive ratings overall. This could be due to the extensive agricultural development in the catchment portrayed in this scenario, which had already attracted negative ratings in scenario 2, but intensified by the perceptions that TOs would have less power in a weak policy-governance scenario. Another potential issue was that this was the last scenario rated, and the energy levels of participants were low at this stage. Participants generally commented on the potential to further limit access to country associated with this scenario, and the need for outsiders to be culturally aware and ensure TOs are involved in decision-making. One participant wrote in the rating form the following comment regarding scenario 4:

> *'It will affect from the top of the river catchment along the Fitzroy, also along the rivers from the top, also side coming into the river, it **will** affect the river.'* (bold in the original)

Box 4. Summary of the potential conditions in the Fitzroy River catchment under scenario 4.

- Weaker policies that favor external interests and result in uncertainty; based on weak individualistic leadership (uncoordinated decisions) and weak Indigenous governance (less Indigenous empowerment and participation) that result in poor planning and management
- Higher demand and investment in development initiatives that modify natural-cultural landscapes
- Negotiations around development are less fair and take place under unequal conditions
- Decisions are not always evidence-based and monitoring of environmental impacts is limited



- Land use dominated by grazing natural vegetation
- Land and water management, including cattle control and reduced overgrazing does not improve
- Access to country remains limited, including for recreation, subsistence, and cultural activities
- Small-scale investment in carbon farming using savanna burning (low carbon price)
- Low increase in number and extent of conservation areas (12%), limited joint management with TOs
- Modest increase (125%) in cultural- and nature-based tourism (65% Indigenous)
- One new small-scale coastal barramundi farm
- High increase of resource extraction (higher impact)
- 6,000 ha of groundwater (110 GL, 3.1% of recharge) and 18,000 ha off-stream (360 GL, 7.3% of median discharge) irrigated Rhodes grass

The categories where some potential improvement was detected included ‘knowledge of country and culture,’ followed by ‘inner peace, spiritual fulfilment’ (Figure 7), but note that those categories were rated positively by one participant each. Also, ‘Satisfying work’, ‘strong family and community’ and ‘places and things that make you feel good’ scored 1 point each. However, there were no positive comments registered in association with this scenario.

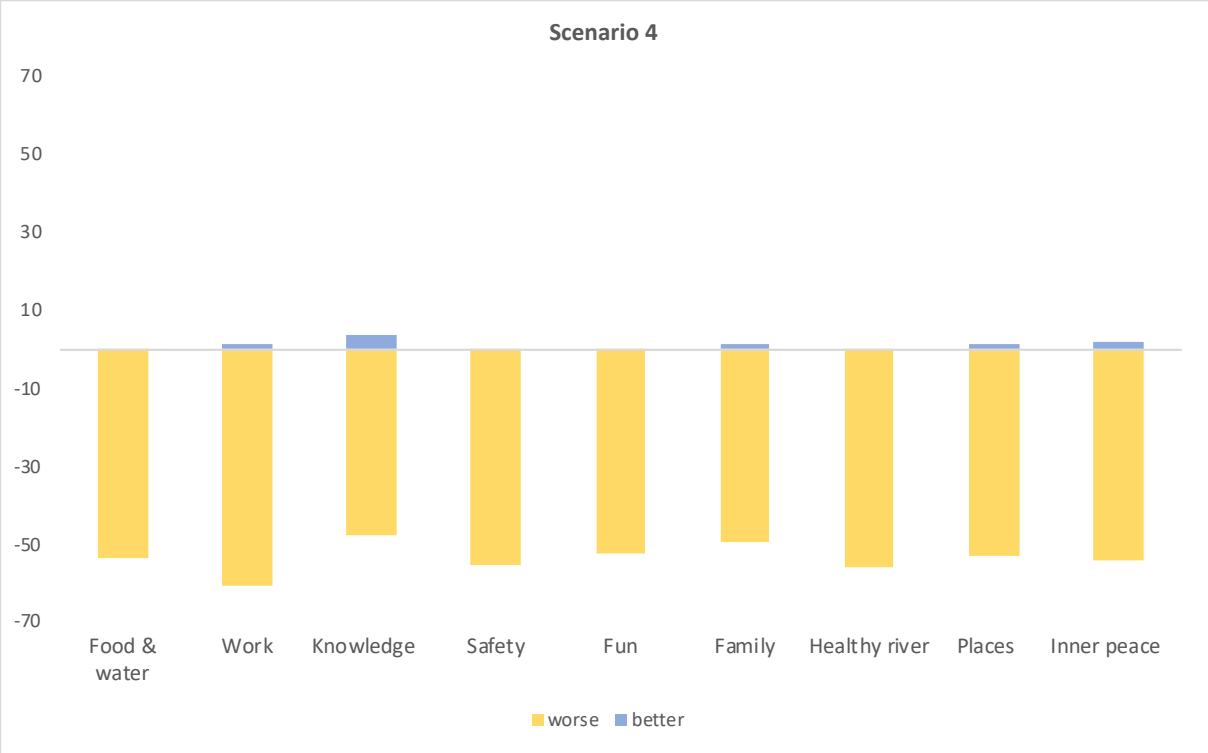


Figure 7. Scenario 4. Sum of the positive ('better') and negative ('worse') ratings per wellbeing category. Comparisons are with the current situation.

The wellbeing categories most negatively impacted were 'satisfying work', 'healthy river country', and 'safety' (Figure 7). Participants' comments regarding 'satisfying work' were mostly related to ranger jobs – that there would be less ranger jobs in this scenario, and questions regarding how many ranger jobs there will be relative to the unemployed population of all communities along the river, and who would get those jobs. Regarding 'healthy river country, some participants considered that this would be similar to today, while a female thought that if TOs are not allowed to go onto country, then country won't be healthy. Another female participant stated that:

> *'If there is poor governance people will have less respect, so there will be more rubbish and no organisation to get it cleaned up. These are the problems that no one can get it together or they will just be fighting about how to fix it. Instead of finding ways to get better or work together.'*

There were no significant comments on 'safety' and this was also the category with most 'no change' ratings, with 2 ratings. Interestingly, all the other 'no change' ratings came from the same participant, who scored 'no change' in all categories, presumably to state that scenario 4 would have the same effect as today in the wellbeing of TOs in the catchment.

5. Discussion and conclusion

5.1 Goals 1 and 2

1. developing a common language around wellbeing
2. developing shared knowledge of wellbeing today.

The workshop achieved the goal of developing a framework that allowed participants from different cultures and representing different interests to discuss the potential changes in wellbeing associated with alternative futures for the catchment. Overall, participants were able to relate to most wellbeing categories. They were comfortable in using these categories to discuss key aspects of wellbeing and in using them to assess the effects of future scenarios. Based on participants' quantitative assessments of the scenarios, the different categories of wellbeing are all positively or negatively affected by change, and, on that basis and the group evaluation, are relevant. Overall, the quantitative assessments highlighted 'healthy river country', 'inner peace-spiritual fulfilment' and 'knowledge of culture and country' as those categories of wellbeing that contribute most to the assessment of change.

In contrast to the quantitative outputs, group discussions of the current situation in the catchment suggested that 'having fun' and 'places and things that make you feel good' (aesthetics) are not seen as important, at least in the form presented. This almost certainly reflects the need to further rework the categories to ensure they are more culturally appropriate. Despite this, it should be noted that the quantitative results show that these categories had similar 'weight' in the scenario analyses to many other categories. Participants scored them highly (either positive or negatively), which mean that they may contribute significantly to the wellbeing of the groups they were thinking of when assessing the scenarios. Another interesting point is that 'spiritual fulfilment/inner peace' may be seen by participants more as a summary statement, i.e. affected, to some extent, by all the other wellbeing categories. Additionally, some participants suggested, during the workshop evaluation, that there were important aspects of wellbeing not covered, such as holistic relationships with nature and customary law (see Appendix 5). As noted in Appendix 5, matters such as customary law and skin/totem relationships are part of the broader conceptual framework that includes the wellbeing categories. For example, customary law can be treated as 'principles' (ethical properties of human behaviour) that instrumentally contribute to human wellbeing (see Wallace et al. 2020). Nevertheless, the evaluation of the wellbeing categories (Appendix 6) highlights important points, particularly the role of principles-customary law and overall system relationships, were not sufficiently covered. This reflects the need for application of the full framework, which would have required additional resources. To do this would also require consultation to ensure categories and concepts are culturally appropriate. Other issues, like poverty, housing and water quality should, with more detailed investigation, readily map to one or more of the wellbeing categories. Also these, and 'threatening processes', would be considered fully under a broader planning process (e.g. Wallace 2012), but were outside of the scope of the assessment of scenarios.

Finally, there were important cross-cutting themes revealed when participants discussed the holistic nature of Aboriginal wellbeing in regards to how it is currently satisfied within the catchment (Table 3 and Appendix 4). Some of these relate to threats/problems, such as issues surrounding illegally locked gates that denied access to native title lands, and trust

among various groups; but other themes are of a higher order. For example, being on and looking after country, maintaining culture including language, and maintaining knowledge and related activities. Although in all cultures a single activity may contribute towards a number of wellbeing categories, for the TOs, the threads of wellbeing seem more tightly integrated with country, both within and across lives. Further analysis of the information collected during this workshop, planned for the next few months, will investigate these aspects more fully.

5.2 Goals 3 and 4

3. participants views on changes in wellbeing under alternative scenarios
4. recommend a way to assess future changes on the wellbeing of different social groups.

The workshop achieved the goal of assessing TOs' changes in wellbeing associated with future scenarios. Most scenarios were assessed – minus scenario 3 due to time limitations. Scenario 4, the last one, was assessed by less people. Participants' ratings followed a similar pattern (Figure 2), with scenario 1 having the most positive ratings, and scenarios 2 and 4 having mostly negative ratings. The negative ratings seem to be linked with an aversion to large-scale irrigated agriculture and its perceived potential impacts, especially the withdrawal of water (mainly from the river but also groundwater) and pollution. Indeed, 'healthy river country' was among the most negatively affected wellbeing categories in all scenarios (Table 5). Another important cross-cutting theme, also considered as a potential impact of large-scale agriculture, was the loss of access to country, which seemed to impact particularly 'inner peace and spiritual fulfillment', as well as other aspects of wellbeing.

'Knowledge of country and culture' seemed to improve in scenarios 1 and 2 (and 3, but it was rated positively by only one participant), being mostly related to an increase in ranger jobs, and to better access to country in scenario 1. 'Satisfying work' was also positively assessed in scenarios 1 and 2, mainly due to an increase in ranger jobs and the potential for Indigenous owned enterprises. However, participants emphasised that these jobs and enterprises could only be fulfilled by TOs, and thus be considered as satisfactory, if there were training initiatives in place to build TO's capacity. Likewise, 'satisfying work' was the most negatively affected category in scenario 4 due to limited ranger jobs and uncertainty regarding who would be able to fulfil those vacancies.

The workshop successfully achieved all goals. Nevertheless, there were several areas of improvement suggested by participants (see Appendix 5). Those suggestions were incorporated in the scenario team workshop in Broome in October 2019. Overall, this workshop was an important step towards developing a way to assess future changes on the wellbeing of different social groups (goal 4). Having a common language around wellbeing that allows for discussions between different TO groups, and between TOs and other groups interested in the Fitzroy River catchment is important. Moreover, several participants liked the fact that conversations went beyond the potential of new jobs and monetary benefits towards understand how future development can affect various aspects of wellbeing. This indicates the importance of undertaking more comprehensive assessments (like the one developed under this project) to facilitate meaningful discussions and negotiations around land and water use in the catchment (including as part of the ongoing planning initiatives). This way to talk about what could happen in the future and how it affects people's wellbeing may assist organisations and individuals to discuss important matters that could be affected

by future land and water use decisions. It can also help organisations to think about the aspects of scenarios (drivers and outcomes) that are desirable or unfavourable given their group's aspirations, and this to identify strategies to direct actions towards preferred scenarios (and away from less desirable ones) given possible constraints under alternative scenarios. Last, we recommend that future research could explore aspirational scenarios since there seemed to be an interest in that approach to future scenario development by workshop participants.

6. Next steps

Whilst we emphasise results cannot be generalised as a representative sample of TOs in the catchment, they provide an indication of key aspects of wellbeing that could be affected (positively or negatively) under alternative development scenarios and their associated changes in land and water uses. The assessment thus provides valuable information for Traditional Owners, pastoralists, government agencies, and other organisations with interests in the future of the region to identify key aspects that need further discussion and consideration during ongoing and future land and water use planning initiatives. In this sense, we encourage research partners to build on the proposed assessment approach and results to further explore these aspects. Additionally, groups and organisations can use the broad structure of scenarios to create alternative scenarios (e.g. as part of aspirational planning led by interested organisations) and include other development initiatives (e.g. bush foods, service and retail, and renewable energy), which we were unable to incorporate due to data and time constraints.

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Appendix 1: List of participants

Andrea Myers

Alistair Hobbs

Anne Poelina

Bernadette Williams

Chloe Nulgit

Damien Parriman

Debbie Cherel

Dennis Chungula

Heather Wungudin

Hector Hobbs

Ian Perdrisat

Ina Kitching

Jean Malay

Joe Ross

Mary Aiken

Mervyn Street

Peter Murray

Ross James

Stewart Morton

Tim Cranbell

Zacharias Spinks

Appendix 2: Definitions of the drivers used to build the logic of scenarios

Variations of the primary and secondary drivers

During workshop 2, participants worked in tables with facilitators rotating across tables to describe the range of possible variations of the primary and secondary drivers. The description included defining at least the two end states (opposite poles, e.g. low and high). For each driver, the group wrote brief texts describing how each end state might look like in the future. Following concerns regarding the framing of the markets' driver, researchers proposed alternative descriptions for this driver. Several options were considered and a revised framing was adopted; these options and a summary of discussions are described in the brief of workshop 2. The description of the possible variations of drivers (**Table 1**) was adjusted and enriched following conversations with scenario team members and used to describe the four scenarios.

***Table 1**. Broad description of the variations (opposite poles) for the primary and secondary drivers. The table describes the 'end states' identified by participants for each of the six drivers, which were used to describe and build each of the four scenarios.*

Drivers		Summary of drivers' end states (opposite poles)
PRIMARY	Markets[5]	*Higher[6] demand/investment[7] in development initiatives that modify natural landscapes[8]*: dominant demand and investment in markets that focus on development initiatives (industries) associated with relatively higher modification of natural landscapes. *Higher demand/investment in development initiatives that maintain natural landscapes[9]*: dominant demand and investment in markets that focus on development initiatives (industries) based on the use, management, and/or restoration of natural and largely undisturbed landscapes.
	Policies	*Strong policy*: in a strong-policy end state, policy is developed and implemented in a way that protects things valued by the local community and provides certainty and clarity for everyone living in the region.

[5] The definition and description of variations for the 'markets' driver was refined by the research team following discussions during the workshop. Other aspects will shape how actors will respond to external markets, for example in terms of whether local people will invest or allow others to invest on their land. Ultimately, the outcomes in terms of the type of investments (and developments) will derive from the combination of all drivers, not only markets.

[6] In this context, higher is not relative to the current situation (today), but to the opposite pole.

[7] Including investment implies that, under a higher demand scenario, people may choose to invest or allow others to invest.

[8] Examples of initiatives could include intensification of pastoral enterprises based on higher stocking rates and/or introduced exotic grasses, broad acre irrigated agriculture, bush food monoculture plantations, mining, unconventional gas, mass tourism, and solar farms (generally grouped with initiatives that fall within state 2, these initiatives fit better here because they involve vegetation clearing). Initiatives supported or promoted under this state are not necessarily associated with large-scale footprints (e.g. a mining project could modify a very small surface area of the catchment).

[9] Examples of initiatives could include extensive low-stocking rate pastoralism aiming to maintain, restore and/or protect natural landscapes, carbon abatement through savanna burning, wild bushfood collection, recreational fishing, bush food enrichment, nature and cultural tourism, and conservation stewardship.

		Weak policy: in a weak-policy end state, policy is divisive and does not support the protection of things valued by the local community, resulting in uncertainty for everyone in the region.
SECONDARY	Leadership	*Strong leadership*: leaders at all levels (local, regional, national) willing to work collaboratively to achieve an inclusive vision for the catchment; these passionate and motivated leaders are representative of the region and ensure positive outcomes for everyone. *Weak leadership*: characterised by a single actor unwilling to collaborate and making self-interested decisions; in a weak leadership end state, leaders are appointed based on nepotism and focus on conflicts, which polarises people living in the catchment.
	Indigenous governance[10]	*Strong*: strong governance reflects the empowerment of Indigenous peoples and groups; this would result in equivalent strong social (e.g. employment, heath) outcomes for Indigenous peoples. *Weak*: low power of Indigenous people and groups; this would result in equivalent weak social (e.g. employment, heath) outcomes for Indigenous peoples.
	Technology	*Higher access to technology*: means improved access to telecommunication, infrastructure (roads, energy), and monitoring systems (remote sensing and GIS). It could support existing industries (agriculture, mining), increasing the efficiency of natural resource use and reducing their footprint; and new industries would benefit from better access to markets and micro processing of niche products. *Lower access to technology*: means limited access to telecommunication, infrastructure, and monitoring systems. It could result in lower economic competitiveness and lower participation in global trade. It could also mean less modification of natural environment and enhance attractiveness to certain tourism markets (e.g. nature-based tourism).
	Tenure reform	*Higher*: tenure reform is well thought out, transparent, straightforward and communicated to all stakeholders – which generates broad community understanding; it provides a flexible streamlined approach for approvals and certainty around land use planning. *Lower*: tenure reform is slow and unwieldy and a politicised non-transparent process; the process lends itself to inconsistency and reform is imposed with limited community engagement.

The driver related to markets (external demand[11]) and associated investments (local supply) is described in terms of their potential to influence land use change (which was the focus of discussions during the workshop), specifically regarding the level of modification of natural

[10] The driver is about empowerment and is linked with other drivers such as employment and health (as outcomes of Indigenous governance).
[11] Discussions on this driver during the first workshop were around external markets demand, hence this proposal is faithful to the original intent.

landscapes. This framing focuses on external markets, but includes how external and local responses (in the form of investments) could shape development. The examples of development initiatives that could be associated with either end state help to illustrate the model of development that we could expect; these emerged from further discussions with most members of the scenario team when researchers fleshed out the scenarios. Examples also illustrate how the end states can help identify the model of development (e.g. mass tourism developments vs. small-scale cultural and nature-based tourism), rather than the presence/absence of development initiatives.

Similar to the description of other drivers (**Table 1**), impact is not implicit in the definition of the driver related to markets, and neither pole represents "good" or "bad" end states or paths to development, simply different possibilities. Development initiatives in either side of the spectrum could have small or large environmental and/or socioeconomic impacts, which are determined based on the combination of location, footprint, risks, and approach of the development initiatives.

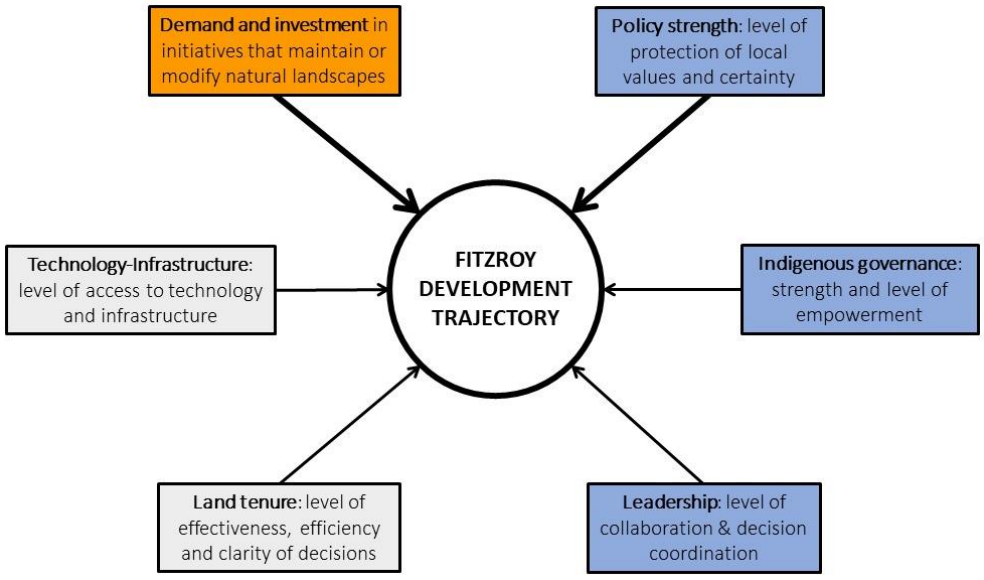


Figure 1. *Primary and secondary drivers selected to build scenarios.*

Three drivers (policies, leadership and Indigenous governance) are effectively in lock step, which means that when one is strong, they all will be, and vice versa, independently of the other drivers (**Figure 2**). While this may not be always the case, given we only have four scenarios, it is a reasonable assumption and simplification.

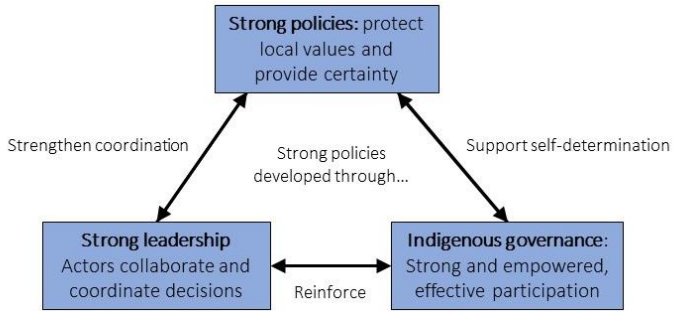


Figure 2. *Bundle of three closely-related drivers*

Under the assumption that policies, leadership and Indigenous governance operate as bundle, we can expect there will be strong policies that protect local values and provide certainty if these are developed through strong and collaborative leadership at local, regional and state levels. In turn, these policies will facilitate and strengthen collaboration between actors at all levels and result in coordinated decision-making. At the same time, it is safe to assume that this arrangement is in lock step with Indigenous governance, where stronger governance contributes to developing strong policies and these in turn can support self-determination. Finally, we expect that collaborative leadership and strong Indigenous governance will be mutually reinforcing. The outcomes of this situation include strong institutions of governance and regulation, including rule of law. We could also expect that under this situation honesty, care, justice, respect and tolerance would be followed by the different stakeholders involved in decision making.

Regarding tenure reform, three features can help differentiate between stronger/weaker land tenure reform and its implementation (including in relation to Native Title): (a) Effective: appropriate approvals processes and mechanisms for decision-making and negotiation/agreement making are in place and complied with; this facilitates access to opportunities; under this state, decisions safeguard and take account of cultural protocols, cultural institutions and community interests; (b) Efficient: decision making and approval processes are more efficient (including Free Prior Informed Consent) and have lower transaction costs, but not through weakening Indigenous land owners' and native title holders' procedural rights (i.e. steps taken to enforce legal rights); and (c) Clear: terms and implications of land use agreements are clear to communities, developers, landholders and others involved.

For scenarios with strong Policy-Leadership-Governance bundle, we assume there would be a link to the approach to tenure reform/system. First, land use approval processes would likely support Indigenous land owners and native title holders to be proponents or partners in economic development on their land, not just part of a 'tick a box' in approval processes. Second, we expect more effective and efficient decision-making and approvals through increased ability of Indigenous land holder and PBCs to respond to land use applications.

Scenarios built based on the proposed drivers focus on describing the overall balance and how different industries could play out on either end state, but not whether certain initiatives are excluded from a given scenario. Thus, dominance in one state does not mean absence of initiatives that are more prominent in an alternate state, and *vice versa*. Instead, it implies

that the interest and investment in those initiatives could be lower, thus they would be relatively less prevalent across the catchment in terms of frequency and total extent. For instance, under a scenario under the first state, there could be higher demand and investment in extensive broad acre agriculture developments (which could be associated with damming and high use of agrochemicals), while scenarios under the second state could have more investments in small-scale and low-input agricultural developments (e.g. wild harvest, mosaic small farms). Likewise, under the second state, scenarios can include mining developments, but these probably would not be as extensive across the region.

Appendix 3: People and place form

Fitzroy Crossing Workshop Sheet 1: Group, People, Place

Participant No._____ Name: _____

Date_____ Facilitator:_____

1. Select the Traditional Owner group(s) and/or association that you represent or identify with (mark all that apply):

( ) Bunuba Dawangarri Aboriginal Corporation RNTBC

( ) Gooniyandi Aboriginal Corporation RNTBC

( ) Jaru Native Title Holders

( ) Kija claimant group

( ) Ngarrawanji

( ) Yanunijarra Aboriginal Corporation RNTBC / YiMartuwarra

( ) Walalakoo Aboriginal Corporation RNTBC

( ) Tiya Tiya Aboriginal Corporation RNTBC

( ) Warrwa claimant group

( ) Wanjina-Wunggurr Aboriginal Corporation RNTBC / Wilinggin Aboriginal Corporation

( ) Yungngora Aboriginal Corporation RNTBC

( ) Other(s), please specify: _____
(for example, Aboriginal, government, industry or environmental organisation).

2. When we assess the changes in wellbeing-liyan associated with different scenarios, which group(s) of people will you be thinking about? Mark all that apply:

( ) All TOs in the catchment

( ) Your TO group(s) – as marked above

( ) Community Group

( ) Family Group

( ) As an individual

( ) Other(s), please specify: _____
(Aboriginal, government, industry, environmental organisation).

3. When we assess the changes in wellbeing-liyan associated with different scenarios, which part of the catchment will you be mostly thinking about? Mark all that apply:

( ) The river and its total catchment

( ) Community Group area(s), which is/are called _____

( ) Particular station(s), which is/are called_____

( ) Desert country

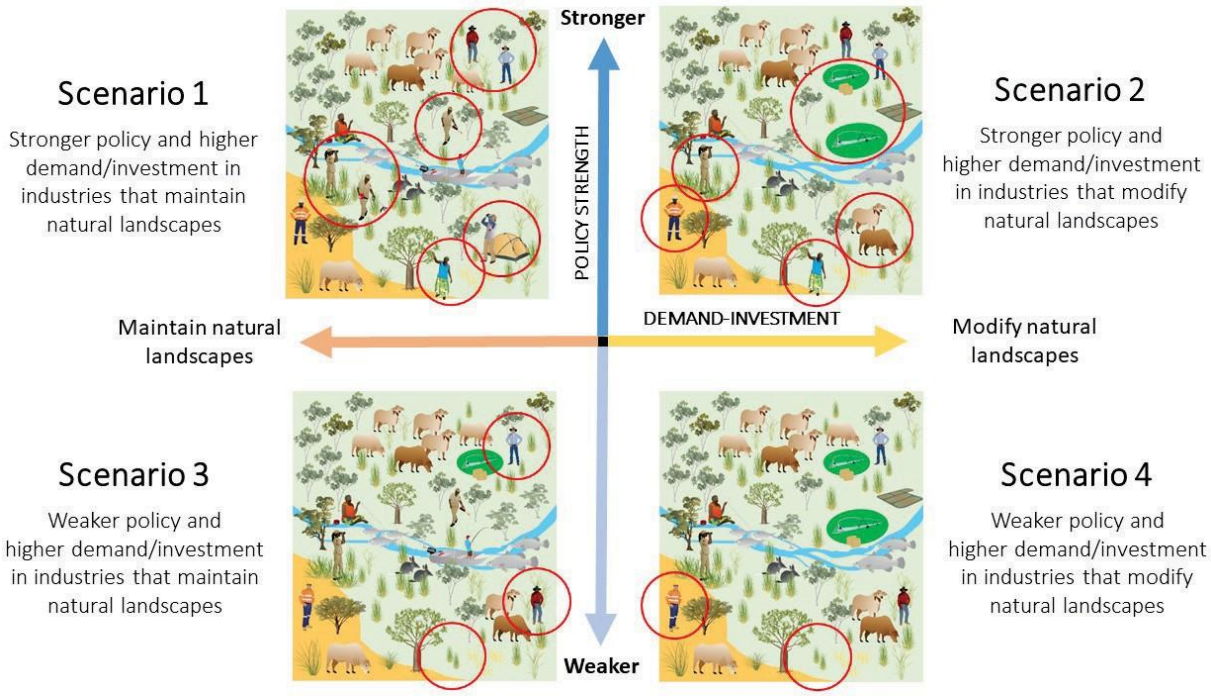
( ) River Country

( ) Hill Country

( ) Other(s), please specify: _____

Appendix 4: Supporting information for current situation and scenarios

Researchers summarised key points regarding the current situation of the catchment and the main differences under the alternative scenarios. They also provided a summary (below) regarding the key considerations and assumptions used to build the scenarios, as well as main information used to inform their analysis.



Baseline

- Agriculture: 4,900 ha cleared; includes irrigated fodder within beef enterprises using surface water (6 GL, 0.12% median discharge), small areas using groundwater (~10 FTE)
- Aquaculture: no commercial aquaculture developments
- Carbon farming: three savanna burning registered projects (northern catchment); one operating including 1,586 km2 of the catchment within IPA (~5 FTE)
- Conservation areas: Parks, IPAs and private reserves of variable size, mainly in northern catchment covering 10,215 km^2, 10% of catchment protected (<50 rangers)
- Tourism: combination of cultural- and nature-based tourism, mostly focused on existing national/state Parks and private conservation areas (~284 FTE)
- Pastoral: Extensive grazing of native vegetation, mostly to live trade market (~152 FTE)
- Resource extraction: scattered and small-scale resource extraction (low impact)

Irrigated agriculture

- Potential crops are many and vary significantly in their extent and use of water, so these are hypothetical examples of possible developments based on available information
- Scenarios were constructed based on variations of two options under consideration: a mosaic of irrigated cotton–mungbean–forage sorghum rotation (groundwater) and irrigated forage Rhodes grass, both integrated into existing beef enterprises
- Rhodes grass has a high gross margin and there is an established market for cotton. We assume enterprises within exclusive would be owned by Indigenous organisations
- Mosaic option assumes third-party investment to build a cotton gin in Kununurra
- Scale based on suggested Based on best estimates of water use for relevant crops
- Distribution based on land suitability, development costs (infrastructure, access), available water options, risk (flooding), avoidance of areas of high conservation value
- Used information from NAWRA, Mowanjum, PEW, literature, researchers, team expertise

Aquaculture

- Aquaculture enterprises could generate an internal rate of return >7% despite remoteness of the catchment, assuming efficient operations, infrastructure and investment
- Considers barramundi aquaculture farms (earthen lined ponds, using local water supply) located near Derby
- Well-established land-based culture practices and markets for harvested products
- Long history of farming in northern Australia, commercial success largely due to tolerance of fresh or saltwater, high stocking densities, fast growth, market demand
- Water use based on best available information
- Distribution based on land suitability, proximity to town, coast (water source), and river (discharge), risks (e.g. flooding), and avoidance of areas of high conservation value
- Data mainly from NAWRA (comparable to NT Barramundi farming handbook)

Carbon farming

- Management regimes that make extensive use of strategic early dry season burning, with fires deliberately lit at times of mild fire weather, and in parts of the landscape where burnt areas will be most effective as firebreaks
- Such burning is likely to reduce the occurrence of large/severe late dry season fires
- Scenarios with more extensive savanna burning will likely have additional benefits for pastoral industry by reducing loss of grass and infrastructure to wildfires
- Well-established practices and growing market, particularly for northern Australia
- Revenue estimates are conservative and only based on abatement, but new carbon abatement and sequestration methods could mean higher revenue
- FTEs and carbon costs based on best-available information
- Scale and distribution based on fire history, costs (access), types of vegetation
- Used information from wide literature, existing projects (e.g. WALFA) and other researchers

Conservation areas

- We assume a combination of national parks, IPAs, private reserves (incl. partial exclusion and management of cattle to minimise impact) funded by various funding sources
- Location determined based on representation of features of conservation interest based on their rarity and vulnerability (varying across scenarios):
  - Bioregions
  - Species (plants, fish, amphibians, reptiles, birds, mammals, invertebrates)
  - Ecosystems (vegetation types, land systems, aquatic systems)
  - Water bodies (dry season pools, billabongs, wetlands, etc.)
  - Vegetation cover and structure
- National Heritage listing: preference given to protecting values within its boundaries
- Based on best estimates of FTEs from own comprehensive dataset and literature
- Used information from wide sources, including own models, models developed together with other NESP projects, available databases, literature review and experts

Cultural and nature-based tourism

- Enterprises may vary in their focus, but we assume most would incorporate a combination of cultural- and nature-based tourism aspects and, due to its nature, new enterprises would be predominantly lead and managed by an Indigenous organisations
- Hypothetical increase in tourism visitation (and corresponding number and size of new enterprises) based on extrapolating from current trends and reported possible values, assuming limited supply (no market cap in terms of demand)
- Direct expenditure based on average values for stay and spend
- Max level of development assumes twice visitation numbers (KDC suggests 300% increase), under the same level of expenditure, but higher international visitors higher expenditure
- Variations in enterprise development also consider possible variations in investment in infrastructure and capacity building, which will enable or constrain opportunities for growth
- Conservative values for direct expenditure based on Based on TRA (2016) average stay and average spend, Kimberley Blueprint, PEW Study, Shires' publications, and team's expertise

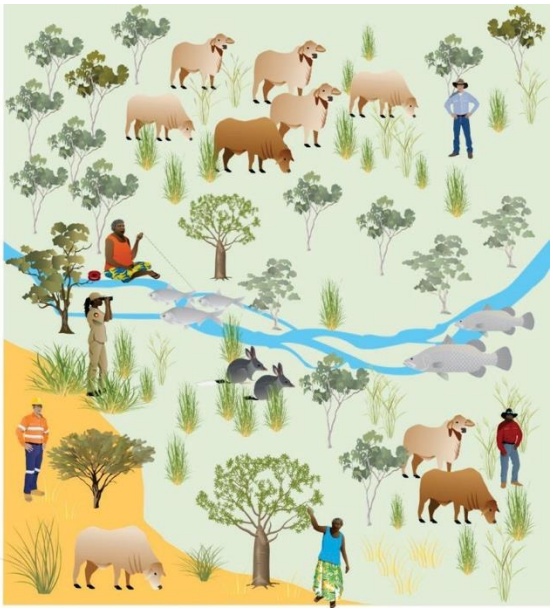
Resource extraction

- To estimate the likelihood of resource extraction taking place within the catchment, we collated all available data on current and proposed mining leases and exploration permits (petroleum, minerals, coal, infrastructure and known mineral occurrences)
- Linear features (e.g. pipelines) and points (e.g. drill holes, mineral occurrences) were represented by buffering to 250 m
- The data from each source was split into five categories in order of likelihood (high low):
  - Currently active mine sites
  - Proposed mines and applications for mining leases

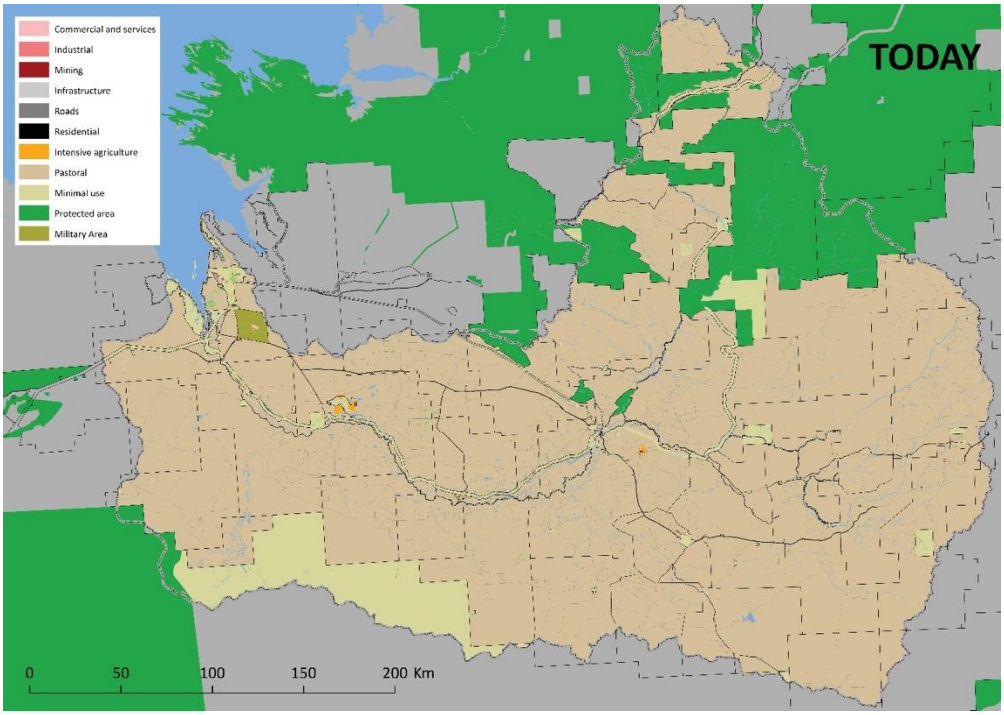
    - Current exploration permits
    - Known resource presences
    - Applications for exploration permits and areas advertised for exploration
- The impact of resource extraction on the environment depends on projects following policy, best practice, and environmental impact guidelines and cannot be estimated reliably.

Today

- Native title exists over 96% of the catchment, but there are some problems in access to country, including for recreation, subsistence, and cultural activities
- Overall, the regional visioning and objective setting in the catchment is fragmented among stakeholders, but there are opportunities for improved collaborative leadership and strengthening of Indigenous governance
- Existing policies protect local and national values (including those of national and international significance)
- Most enterprises in the catchment are based on industries that maintain natural vegetation
- Negotiations around development are not always seen as fair or taking place under equal conditions



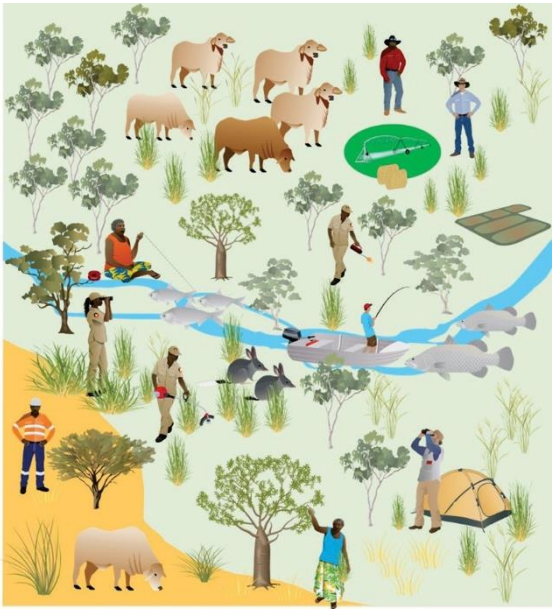
- land use dominated by grazing natural vegetation
- cattle can access some sensitive areas and there is some level of overgrazing in others
- some problems in access to country, including for recreation, subsistence, and cultural activities
- some interest in investment in carbon farming using savanna burning (one new project registered)
- parks, IPAs and private reserves of variable size, mainly in northern catchment (10% protected)
- some cultural- and nature-based tourism on existing national/state parks and private conservation areas
- no commercial aquaculture developments
- small-scale resource extraction (low impact)
- irrigated fodder within beef enterprises uses surface water extraction (6 GL, 0.12% of median discharge),small areas w/ groundwater.



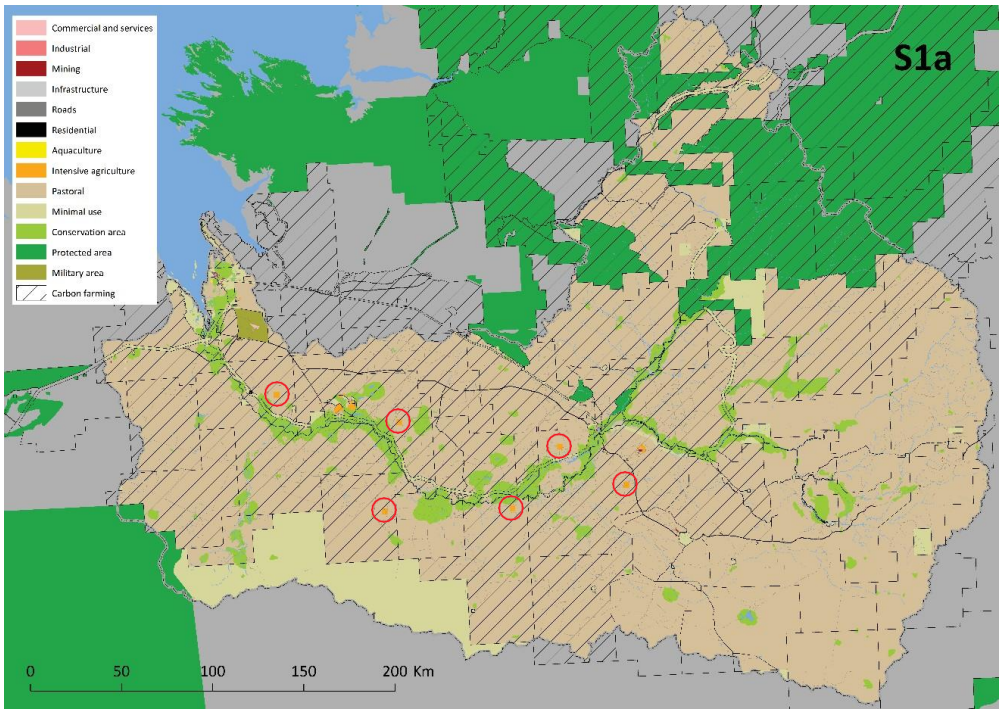
	Description & value	Distribution	Employment	Other
Irrigated agriculture	Irrigated fodder within beef enterprises; mostly surface water extraction, small areas w/groundwater Value: **$2.4 million**	4,900-ha developed land (2.7% of usable land), large portion (94%) in 2 main developments (Liveringa, Gogo), 6% within Indigenous stations	Mainly non-Indigenous enterprises; unknown actual FTEs, but possibly ~10 FTEs including some Indigenous (seasonal) workers	Small development with some consideration of local values Surface: 6 GL/year (0.12% of median discharge) Groundwater : 6.4 GL/year (0.18% of median recharge)
Aquaculture	N/A	N/A	N/A	N/A
Carbon farming	**Small-scale** carbon farming area using savanna burning (aerial + ground activities) Value: **< $0.1 million**	Three registered projects in the north, but only one operating covering 1,586 km^2 (within the catchment) of Indigenous land (**100%)**	**5 FTE (Indigenous rangers)**, project led and managed by Indigenous organisations in IPA; good coordination in the area	Little abatement effort leads to **low carbon price** ($15) and still limited support for enterprises
Conservation estate	Variable size parks, two partial overlapping with catchment; total area: 10,215 km^2 (10% of the catchment)	Protect key values, but not yet comprehensive; some level of residual reservation (i.e. avoid areas of very-high production potential); moderately connected	State and private management of most areas (with some joint management). Unequal distribution of costs/benefits across TO groups Estimate: **~40 rangers**	Collaborative planning and limited funding to manage and monitor threats (e.g. fire, weeds, pests) **Some traditional uses**
Tourism	Some cultural- and nature- based tourism Domestic: 86,700 visitors International: 10,000 visitors Value: **$67 million**	Mostly focused on Shire of Derby-West Kimberley, some in Halls Creek; bush walking and visiting national/state parks and private conservation areas	**284 FTE** across 17 businesses (5-20 each, 17 average); most operate from main towns and some employ local guides	Limited supply; low investment in marketing and product development, infrastructure, and capacity building of Indigenous organisations
Pastoral	Extensive grazing of native vegetation, mostly to live trade market (71%) Value: **$74 million**	Average size of 230,129 ha (15,919 - 403,189) and herd of 8,200 AE (629 - 21,860), sum ~331,000 AE (208,600 head)	**152 FTE** on-farm worker for the pastoral land portion within the catchment; **58** Indigenous (15% Indigenous, Kimberley average)	Some problems with access; variable control of grazing in sensitive areas (exclusion from few areas) and some areas are being overgrazed
Resource extraction	Resources in the catchment include coal, diamonds, precious metals, oil and gas, and quarrying Value: **$500 million**	Proposed: 147 km^2 (0.15%) Exploring: 26,986 km^2 (27.32%) Known: 183 km^2 (0.19%) Applications: 7,987 km^2 (8.09%)	Highly variable; e.g. 266 people were employed in 2011, compared to 32 in 2016	A major contributor to the economy, but variable and significant downturn in mining in the last few years, with a number of mine closures

Scenario 1(a)

- Stronger policies protect local and national values (including those of national and international significance) and give certainty; also, strong collaborative leadership (coordinated decisions) and strong Indigenous governance (Indigenous empowerment and participation, recognised by other stakeholders) enable better planning and management
- Higher demand and investment in development initiatives that maintain natural-cultural landscapes
- Negotiations around development are more fair and take place under equal conditions
- Evidence-based decisions and monitoring allow identifying changes and adjusting uses accordingly



- land use dominated by grazing natural vegetation
- better land and water management, including cattle control and reduced overgrazing
- better access to country, including for recreation, subsistence, and cultural activities
- good investment and extensive carbon farming using savanna burning (less large & hot fires)
- large increase in the number and extent of new conservation areas (17%), managed through joint management
- large increase (+100%) in cultural- and nature-based tourism (85% Indigenous businesses)
- one new small-scale coastal barramundi farm
- similar level of resource extraction (low impact)
- six new medium-scale irrigated agriculture based on groundwater (100 GL, 2.9% of recharge).

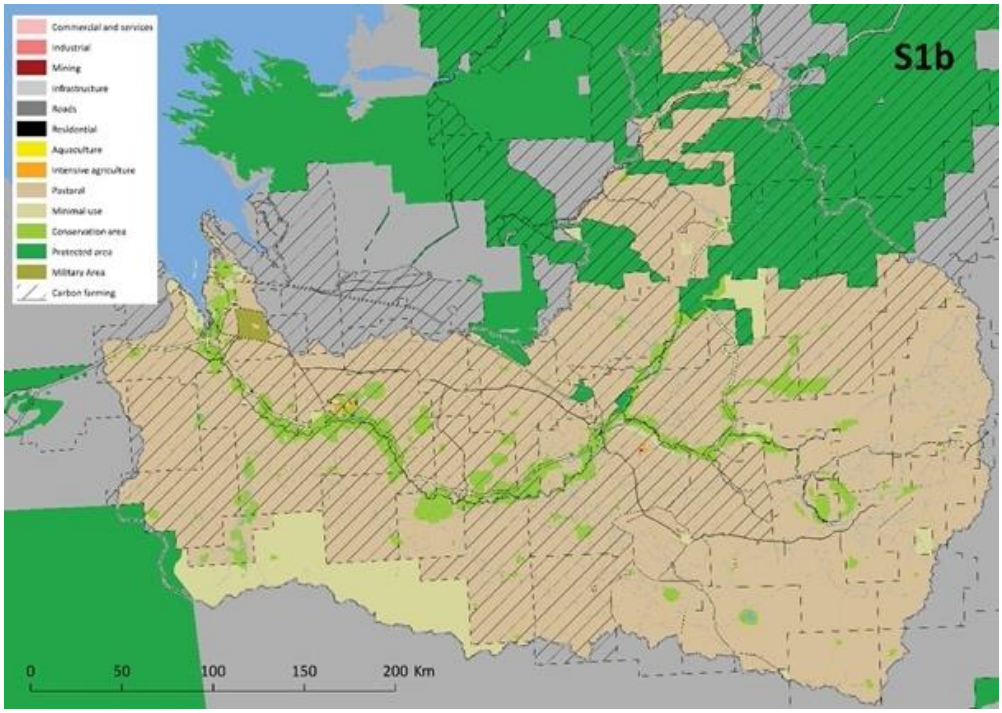


	Description & value	Distribution	Employment	Other
Irrigated agriculture	Rhodes grass stand and graze (spray irrigation, *groundwater*) integrated within existing beef enterprises Value: **$47 million**	**Six medium** developments in Grant Group-Poole Sandstone; 6 x 1,000 ha = **6,000 ha** (3.3% of suitable land, 122% increase); **33%** within Indigenous stations	**46 FTE: 34** unskilled (6 each), **29** Indigenous (*2 Indigenous stations w/*100% Indigenous; *4 x non-Indigenous* (80% Indigenous) *stations*; **12** skilled (1 manager, 1 permanent p/u)	Moderate development with consideration of local values (minimise impact) Water: **100 GL** (17 each), **2.9%** of annual recharge
Aquaculture	Coastal, intensive barramundi farm with earthen lined ponds, using local water supply Value: **$7.3 million**	**One farm** close to Derby; **100 ha** (30 x 1 ha ponds, 0.3% of suitable land)	**15** FTE: 1 manager, 4 skilled technicians, 7 trainees, casuals (80% Indigenous farm workers)	Small development considers local values, minimise impact Water: **500 ML, 0.01%** of annual recharge
Carbon farming	Large-scale carbon farming using savanna burning (aerial + ground activities) Value: **$3.7 million**	Project across the catchment, summing 61,694 km^2; include 19,766 km^2 of Indigenous land (32%) + 41,928 km^2 managed via ILUAs	**185 rangers**, projects managed by Indigenous orgs, via ILUAs within areas where there is no exclusive title	Strong abatement effort results **in high carbon price** ($38) and policies supporting enterprises Coordinated projects across large areas reduces costs and maximises outcomes
Conservation estate	Conservation areas (national and state parks); high targets maximise protection and complement existing protected areas	Significant increase to **16,459 km^2** (17%); high-impact approach (mitigate threats); well connected	**Joint management** with TOs; coordination leads to fairer distribution of costs and benefits **82 rangers** across all parks	Collaborative planning and high funding to manage and monitor threats (e.g. fire, weeds, pests) Allow **traditional uses**
Tourism	Integrated cultural- and nature-based tourism; +100% increase 173,000 domestic 20,000 international Value: **$134 million**	Visit conservation areas and other areas of interest; 85% of the new tourism enterprises would be indigenous owned/managed	**578 FTEs** across 34 businesses (17 people each; most operate from towns, but employ people (guides) from communities within vicinity (85% Indigenous)	Good investment in road (more access) and infrastructure, as well as in capacity building and governance
Pastoral	Extensive grazing of native vegetation, mostly to live trade market (71%) Value: **$69.3 million**	Average size of 230,129 ha (15,919 - 403,189) and herd of 8,200 AE (629 - 21,860), sum ~331,000 AE (208,600 head)	**144 FTE** on-farm worker for the pastoral land portion within the catchment; 115 Indigenous (increase to 80% on average)	Better access; improved control of grazing (including exclusion from sensitive areas) and reduction of overgrazed areas
Resource extraction	Potential resources in the catchment include coal, diamonds, precious metals, oil and gas, quarrying, etc.	Proposed: 118 km^2 (0.12%) Exploring: 24,232 km^2 (24.5%) Known: 178 km^2 (0.18%) Applications: 7,638 km^2 (7.7%)	Unknown (highly variable)	Expected higher participation of Indigenous people in workforce

Scenario 1(b)

- Stronger policies protect local and national values (including those of national and international significance) and give certainty; also, strong collaborative leadership (coordinated decisions) and strong Indigenous governance (Indigenous empowerment and participation, recognised by other stakeholders) enable better planning and management
- Higher demand and investment in development initiatives that maintain natural-cultural landscapes
- Negotiations around development are more fair and take place under equal conditions
- Evidence-based decisions and monitoring allow identifying changes and adjusting uses accordingly

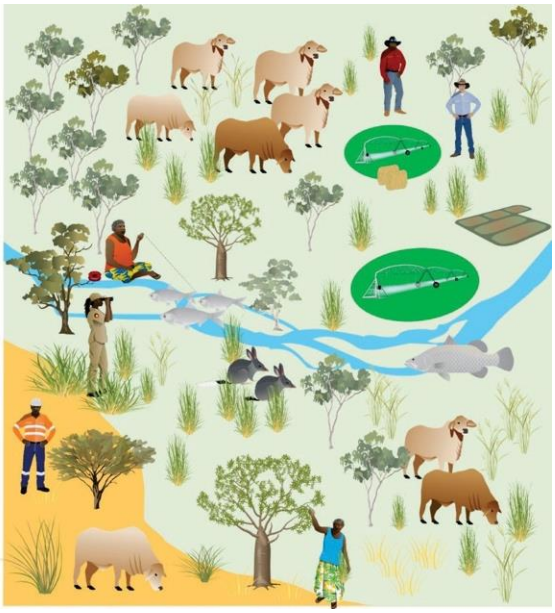
- land use dominated by grazing natural vegetation
- better land and water management, including cattle control and reduced overgrazing
- better access to country, including for recreation, subsistence, and cultural activities
- good investment and extensive carbon farming using savanna burning (fewer large & hot fires)
- large increase in the number and extent of new conservation areas (17%), managed through joint management
- large increase (+100%) in cultural- and nature-based tourism (85% Indigenous businesses)
- one new small-scale coastal barramundi farm
- similar level of resource extraction (low impact)
- no new irrigated agriculture developments.



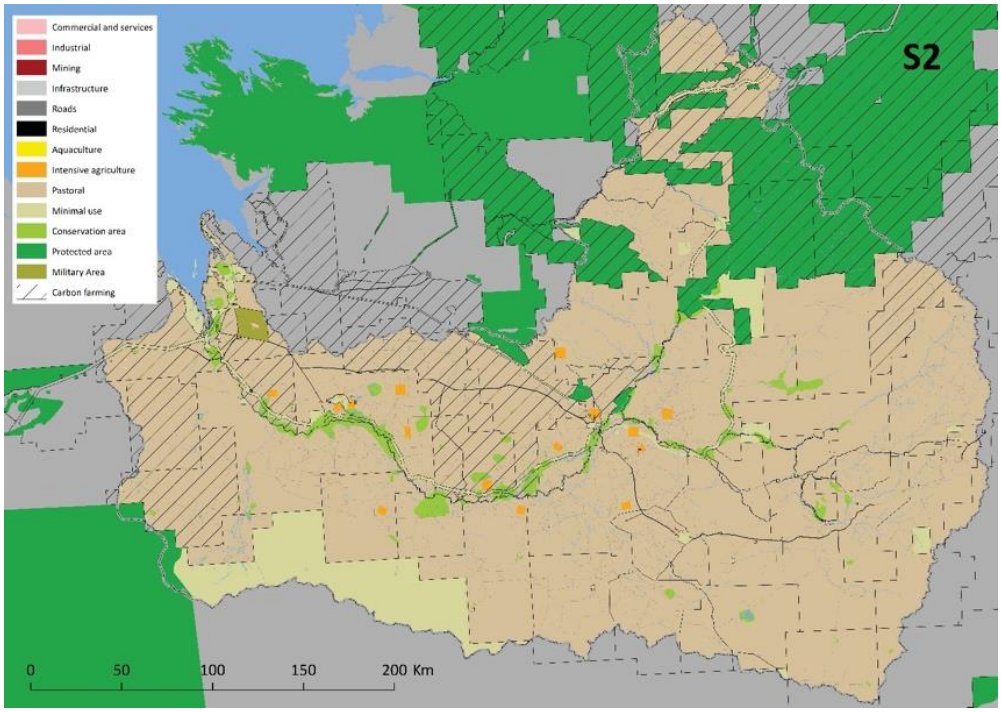
	Description & value	Distribution	Employment	Other
Irrigated agriculture	No new irrigated agriculture developments	N/A	N/A	N/A
Aquaculture	Coastal, intensive barramundi farm with earthen lined ponds, using local water supply Value: **$7.3 million**	**One farm** close to Derby; **100 ha** (30 x 1 ha ponds, 0.3% of suitable land)	**15 FTE**: 1 manager, 4 skilled technicians, 7 trainees, casuals (80% Indigenous farm workers)	Small development considers local values, minimise impact Water: **500 ML, 0.01%** of annual recharge
Carbon farming	Large-scale carbon farming using savanna burning (aerial + ground activities) Value**: $3.7 million**	Project across the catchment, summing 61,694 km^2; include 19,766 km^2 of Indigenous land (32%) + 41,928 km^2 managed via ILUAs	**185 rangers**, projects managed by Indigenous orgs, via ILUAs within areas where there is no exclusive title	Strong abatement effort results in **high carbon price** ($38) and policies supporting enterprises Coordinated projects across large areas reduces costs and maximises outcomes
Conservation estate	Conservation areas (national and state parks); high targets maximise protection and complement existing protected areas	Significant increase to **16,459 km^2** (17%); high-impact approach (mitigate threats); well connected	**Joint management** with TOs; coordination leads to fairer distribution of costs and benefits **82 rangers** across all areas	Collaborative planning and high funding to manage and monitor threats (e.g. fire, weeds, pests) Allow **traditional uses**
Tourism	Integrated cultural- and nature-based tourism; +100% increase 173,000 domestic 20,000 international Value: **$134 million**	Visit conservation areas and other areas of interest; 85% of the new tourism enterprises would be indigenous owned/managed	**578 FTEs** across 34 businesses (17 people each; most operate from towns, but employ people (guides) from communities within vicinity (85% Indigenous)	Good investment in road (more access) and infrastructure, as well as in capacity building and governance
Pastoral	Extensive grazing of native vegetation, mostly to live trade market (71%) Value: **$69.3 million**	Average size of 230,129 ha (15,919 - 403,189) and herd of 8,200 AE (629 - 21,860), sum ~331,000 AE (208,600 head)	**144 FTE** on-farm worker for the pastoral land portion within the catchment; **115** Indigenous (increase to 80% on average)	Better access; improved control of grazing (including exclusion from sensitive areas) and reduction of overgrazed areas
Resource extraction	Potential resources in the catchment include coal, diamonds, precious metals, oil and gas, quarrying, etc.	Proposed: 122 km^2 (0.12%) Exploring: 24,272 km^2 (24.6%) Known: 178 km^2 (0.18%) Applications: 7,638 km^2 (7.7%)	Unknown (highly variable)	Expected higher participation of Indigenous people in workforce

Scenario 2

- Stronger policies protect local and national values (including those of national and international significance) and give certainty; also, strong collaborative leadership (coordinated decisions) and strong Indigenous governance (Indigenous empowerment and participation, recognised by other stakeholders) enable better planning and management
- Higher demand and investment in development initiatives that modify natural-cultural landscapes
- Negotiations around development are more fair and take place under equal conditions
- Evidence-based decisions and monitoring allow identifying changes and adjusting uses accordingly



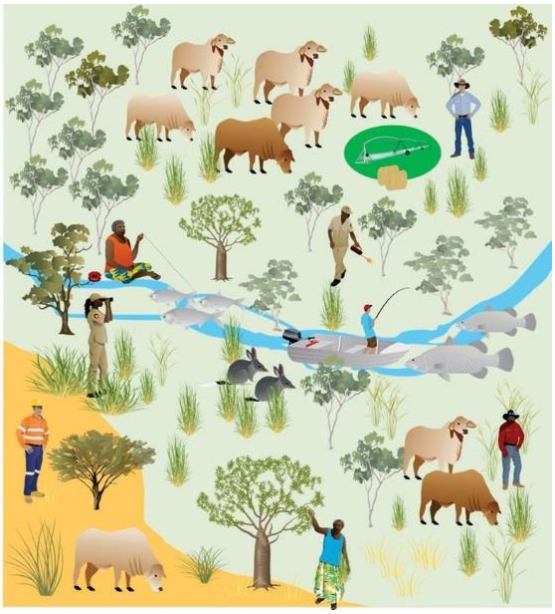
- land use dominated by grazing natural vegetation
- better land and water management, including cattle control and reduced overgrazing
- better access to country, including for recreation, subsistence, and cultural activities
- medium-level investment in carbon farming using savanna burning (moderate reduction in fires)
- medium increase in the number and extent of new conservation areas (13%), incl. joint management
- medium increase (+50%) in cultural- and nature-based tourism (75% Indigenous businesses)
- two new small-scale coastal barramundi farms
- medium increase in resource extraction (low impact)
- 12,000 ha of irrigated rotation system (groundwater: 120 GL, 3.4% of recharge) + 18,000 ha of Rhodes grass (300 GL, 6.1% of median discharge).



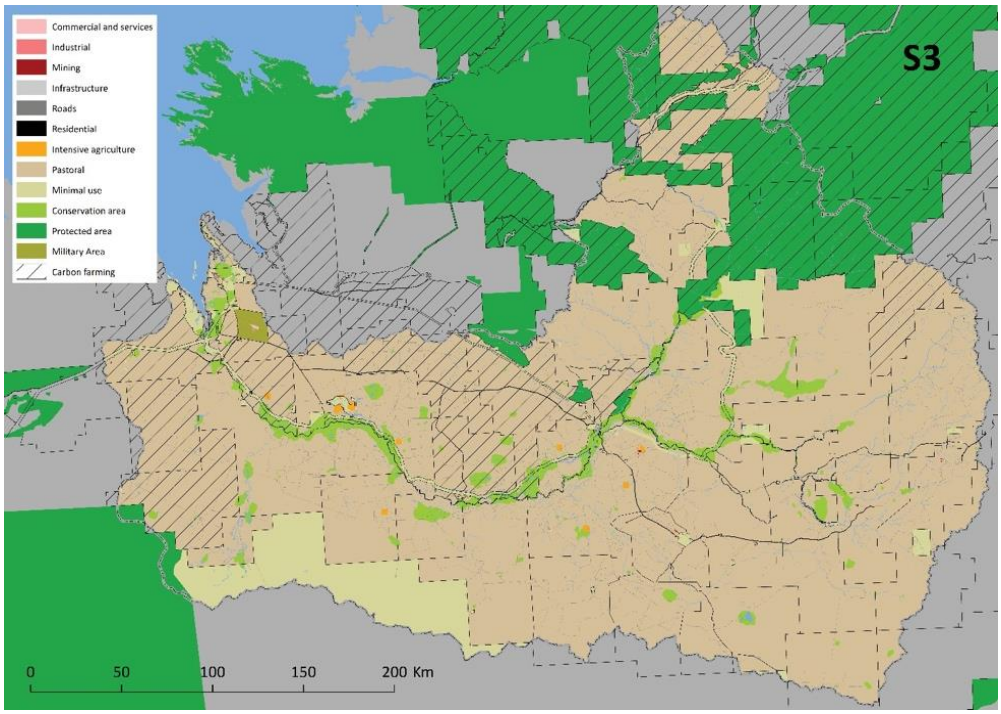
	Description & value	Distribution	Employment	Other
Irrigated agriculture	Rotation (cotton-mungbean-forage sorghum) within beef enterprises (groundwater); value: **$84 million** Rhodes grass stand and graze (spray irrigation, off-stream) integrated within existing beef enterprises; value: **$141 million**	Six 2000-ha farms (**12,000 ha**, 6.7% of suitable land, 245% increase) in Grant Group-Poole Sandstone; **33%** Indigenous Six 3000-ha farms (**18,000 ha**, 10% of suitable land, 367% increase) based on off-stream storage; **33%** Indigenous	**103 FTE: 91** unskilled (15 each), **79** Indigenous and **12** skilled (1 manager, 1 staff p/u) **132 FTE: 120** unskilled (20 each), **104** Indigenous and **12** skilled (1 manager, 1 staff p/u)	Large development with consideration of local values (minimise impact) Groundwater: **120 GL** (20 each), **3.4%** of annual recharge; off-stream: **300 GL** (50 each), **6.1%** of median discharge
Aquaculture	Coastal, intensive barramundi farm with earthen lined ponds, using local water supply Value: **$14.6 million**	**Two farms** close to Derby; **200 ha** (60 x 1 ha ponds, 0.6% of suitable land)	**30 FTE**: 2 managers, 8 skilled technicians, 14 trainees, casuals (80% Indigenous farm workers)	Small development considers local values, minimise impact Water: **1 GL, 0.03%** of annual recharge
Carbon farming	Medium-scale carbon farming using savanna burning (aerial + ground activities) Value: **$2.3 million**	Project across the catchment, summing 28,732 km^2; include 7,291 km^2 of Indigenous land (25%) + 21,441 km^2 managed via ILUAs	**86 rangers**, projects managed by Indigenous orgs, via ILUAs within areas where there is no exclusive title	Strong abatement effort results in **high carbon price** ($38) and policies supporting enterprises Coordinated projects across large areas reduces costs and maximises outcomes
Conservation estate	Conservation areas (national and state parks); medium targets increase protection and complement existing protected areas	Moderate increase to **12,694 km^2** (13%); moderate-impact approach (try avoiding areas of very high production value); moderately connected	**Joint management** with TOs; coordination leads to fairer distribution of costs and benefits **63 rangers** across all areas	Collaborative planning and medium funding to manage and monitor threats (e.g. fire, weeds, pests) Allow **traditional uses**
Tourism	Integrated cultural- and nature-based tourism; +50% increase 130,050 domestic 15,000 international Value: **$100 million**	Visit conservation areas and other areas of interest; 75% of the new tourism enterprises would be indigenous owned/managed	**433 FTEs** across 26 businesses (17 people each; most operate from towns, but employ people (guides) from communities within vicinity (75% Indigenous)	Good investment in road (more access) and infrastructure, and medium investment in capacity building and governance
Pastoral	Extensive grazing of native vegetation, mostly to live trade market (71%) Value: **$91.4 million**	Average size of 230,129 ha (15,919 - 403,189) and herd of 8,200 AE (629 - 21,860), sum ~331,000 AE (208,600 head)	**144 FTE** on-farm worker for the pastoral land portion within the catchment; 115 Indigenous (increase to 80% on average)	Better access; improved control of grazing (including exclusion from sensitive areas) and reduction of overgrazed areas
Resource extraction	Potential resources in the catchment include coal, diamonds, precious metals, oil and gas, quarrying, etc.	Proposed: 124 km^2 (0.13%) Exploring: 25,736 km^2 (26.1%) Known: 178 km^2 (0.18%) Applications: 7,769 km^2 (7.9%)	Unknown (highly variable)	Expected higher participation of Indigenous people in workforce

Scenario 3

- Weaker policies that favour external interests and result in uncertainty; based on weak individualistic leadership (uncoordinated decisions) and weak Indigenous governance (less Indigenous empowerment and participation) that result in poor planning and management
- Higher demand and investment in development initiatives that maintain natural-cultural landscapes
- Negotiations around development are less fair and take place under unequal conditions
- Decisions are not always evidence-based and monitoring of environmental impacts is limited



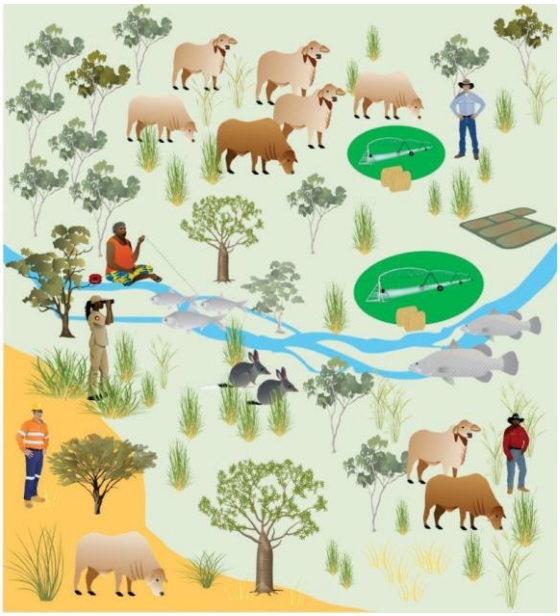
- land use dominated by grazing natural vegetation
- land and water management, including cattle control and reduced overgrazing, does not improve
- access to country remains limited, including for recreation, subsistence, cultural activities
- moderate investment in carbon farming using savanna burning (some reduction of fires)
- moderate increase in the number and extent of conservation areas (14%), with limited joint management with TOs
- small increase (+10%) in cultural- and nature-based tourism (65% Indigenous)
- no coastal barramundi farms
- similar level of resource extraction (some impacts)
- six 1000-ha stand & graze farms (6000 ha) based on groundwater (110 GL, 3.1% of recharge).



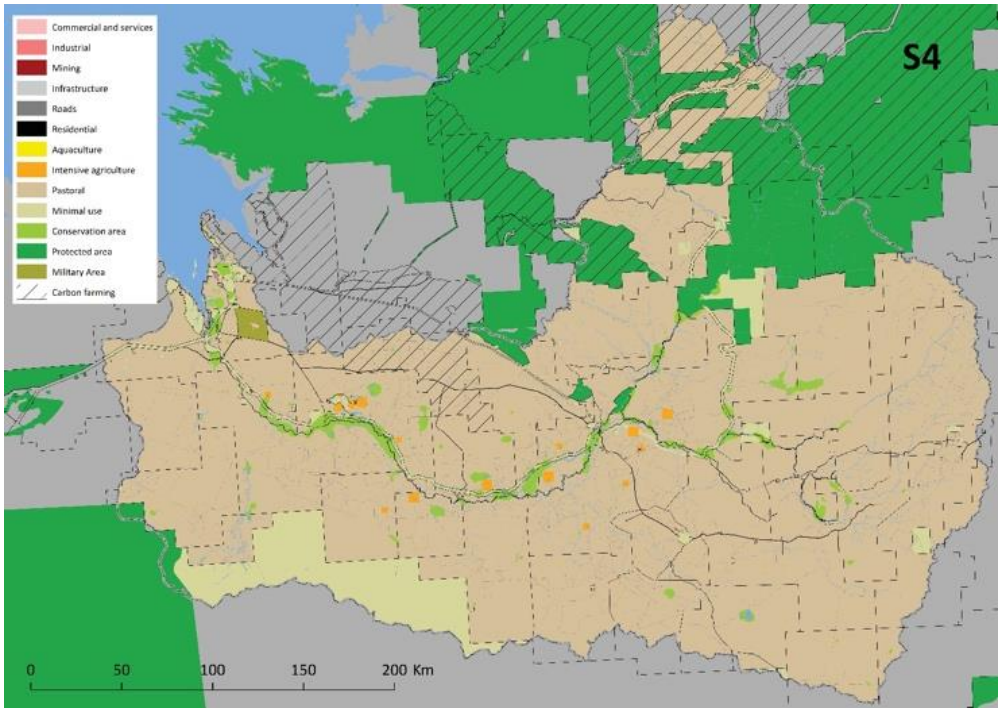
	Description & value	Distribution	Employment	Other
Irrigated agriculture	Rhodes grass stand and graze (spray irrigation, *groundwater*) integrated within existing beef enterprises Value: **$47 million**	**Six medium** developments in Grant Group-Poole Sandstone; 6 x 1,000 ha = **6,000 ha** (3.3% of suitable land, 122% increase); **17%** within Indigenous stations	**46 FTE: 34** unskilled (6 each), **10** Indigenous (*1 Indigenous station w/*100% Indigenous; *5 x non-Indigenous* (15% Indigenous) *stations;* **12** skilled (1 manager, 1 permanent p/u)	Moderate development with limited consideration of local values (minimise costs) Water: **110 GL** (25 each), **3.1%** of annual recharge (compliance issues, limited monitoring)
Aquaculture	N/A	N/A	N/A	N/A
Carbon farming	Medium-scale carbon farming using savanna burning (aerial + ground activities) Value: **$1.4 million**	Project across the catchment, summing 28,732 km^2; include 7,291 km^2 of Indigenous land (**25%**) + 21,441 km^2 managed via ILUAs	**86 rangers (37 Indigenous)**, projects mainly managed by non-Indigenous orgs, via ILUAs within areas where there is no exclusive title	Moderate abatement effort results in **lower carbon price** ($23) and weaker policies to support the enterprises Limited coordination increases costs and lower effectiveness
Conservation estate	Conservation areas (national and state parks); medium targets increase protection and complement existing protected areas to some extent	Moderate increase to **14,094 km2** (14%); moderate-impact approach (avoid areas of high production value); some connectivity	Limited joint management; un-coordinated planning leads to less fair distribution of costs and benefits across TO groups **56 rangers** across all areas	Limited consultation and low funding restrict management and monitoring of threats (e.g. fire, weeds, pests) Limited **traditional uses**
Tourism	Integrated cultural- and nature-based tourism; +10% increase 95,370 domestic 11,000 international Value: **$73.7 million**	Visit conservation areas and other areas of interest; 65% of the new tourism enterprises would be indigenous owned/managed	**323 FTEs** across 19 businesses (17 people each; most operate from towns, but employ people (guides) from communities within vicinity (65% Indigenous)	Poor investment in roads (less access) and infrastructure, and limited capacity building and governance
Pastoral	Extensive grazing of native vegetation, mostly to live trade market (71%) Value: **$69.3 million**	Average size of 230,129 ha (15,919 - 403,189) and herd of 8,200 AE (629 - 21,860), sum ~331,000 AE (208,600 head)	**144 FTE** on-farm workers for the pastoral land portion within the catchment; 55 Indigenous (80% in Indigenous and 15% in non-Indigenous stations)	Limited access; no improved control of grazing (e.g. grazing sensitive areas) and limited reduction of overgrazing
Resource extraction	Resources in the catchment include coal, diamonds, precious metals, oil and gas, and quarrying	Scattered and small-scale resource extraction (some impact); slight reduction of resource extraction (4%), due to increase in conservation areas across the catchment	Unknown (highly variable)	Expected relatively low participation of

Scenario 4

- Weaker policies that favour external interests and result in uncertainty; based on weak individualistic leadership (uncoordinated decisions) and weak Indigenous governance (less Indigenous empowerment and participation) that result in poor planning and management
- Higher demand and investment in development initiatives that modify natural-cultural landscapes
- Negotiations around development are less fair and take place under unequal conditions
- Decisions are not always evidence-based and monitoring of environmental impacts is limited



- land use dominated by grazing natural vegetation
- land and water management, including cattle control and reduced overgrazing, does not improve
- access to country remains limited, including for recreation, subsistence, and cultural activities
- small-scale investment in carbon farming using savanna burning (little improvement in fire mgt)
- low increase in number and extent of conservation areas (12%), limited joint management with TOs
- modest increase (+25%) in cultural- and nature-based tourism (65% Indigenous)
- one new small-scale coastal barramundi farm
- high increase of resource extraction (higher impact)
- 6,000 ha of groundwater (110 GL, 3.1% of recharge) and 18,000 ha off-stream (360 GL, 7.3% of median discharge) irrigated Rhodes grass.



	Description & value	Distribution	Employment	Other
Irrigated agriculture	Rhodes grass stand and graze (spray irrigation, *groundwater*) integrated within existing beef enterprises; value: **$47 million** Rhodes grass stand and graze (spray irrigation, off-stream) integrated within existing beef enterprises; value: **$141 million**	**Six medium** developments in Grant Group-Poole Sandstone; 6 x 1,000 ha = **6,000 ha** (3.3% of suitable land, 122% increase); 17% within Indigenous stations Six 3000-ha farms (**18,000 ha**, 10% of suitable land, 367% increase) based on off-stream storage; 33% Indigenous	**46 FTE: 34** unskilled (6 each), **10** Indigenous (*1 Indigenous station w/*100% Indigenous; *5 x non-Indigenous* (15% Indigenous) *stations;* **12** skilled (1 manager, 1 permanent p/u) **103 FTE: 91** unskilled (15 each), **79** Indigenous and **12** skilled (1 manager, 1 staff p/u)	Large development with limited consideration of local values (minimise costs) Groundwater: **110 GL** (18 each), **3.1%** of annual recharge; off-stream: **360 GL** (60 each), **7.3%** median discharge; compliance issues, limited monitoring
Aquaculture	Coastal, intensive barramundi farm with earthen lined ponds, using local water supply Value: **$7.3 million**	**One farm** close to Derby; **100 ha** (30 x 1 ha ponds, 0.3% of suitable land)	**15 FTE**: 1 manager, 4 skilled technicians, 7 trainees, casuals (15% Indigenous farm workers)	Small development with limited consideration of local values (minimise costs) Water: **500 ML, 0.01%** of annual recharge
Carbon farming	Small-scale carbon farming using savanna burning (aerial + ground activities) Value: **$0.7 million**	Project across the catchment, summing 10,047 km^2; include 3,208 km2 of Indigenous land (32%) + 6,839 km^2 managed via ILUAs	**30 rangers (13 Indigenous),** projects mainly managed by non-Indigenous orgs	Moderate abatement effort results in **lower carbon price** ($23) and weaker policies to support the enterprises Limited coordination increases costs and lower effectiveness
Conservation estate	Conservation areas (national and state parks); low targets, low level of protection; not always complement existing protected areas	Low increase **to 12,356 km^2** (12%); minimise conflict with industry (avoid areas of med- to high-production value); low connectivity	Limited joint management; un-coordinated planning leads to less fair distribution of costs and benefits across TO groups **50 rangers** across all areas	Limited consultation and low funding restrict management and monitoring of threats (e.g. fire, weeds, pests) Limited **traditional uses**
Tourism	Integrated cultural- and nature-based tourism; +25% increase 108,375 domestic 12,500 international Value: **$83.8 million**	Visit conservation areas and other areas of interest; 65% of the new tourism enterprises would be indigenous owned/managed	**361 FTEs** across 21 businesses (17 people each; most operate from towns, but employ people (guides) from communities within vicinity (65% Indigenous)	Some investment in roads (moderate access) and infrastructure, but limited capacity building and governance
Pastoral	Extensive grazing of native vegetation, mostly to live trade market (71%) Value: **$69.3 million**	Average size of 230,129 ha (15,919 - 403,189) and herd of 8,200 AE (629 - 21,860), sum ~331,000 AE (208,600 head)	**144 FTE** on-farm workers for the pastoral land portion within the catchment; **55** Indigenous (80% in Indigenous and 15% in non-Indigenous stations)	Limited access; no improved control of grazing (e.g. grazing sensitive areas) and limited reduction of overgrazing
Resource extraction	Potential resources in the catchment include coal, diamonds, precious metals, oil and gas, quarrying, etc.	Proposed: 147 km^2 (0.15%) Exploring: 26,011 km^2 (26.34%) Known: 179 km^2 (0.18%) Applications: 7,794 km^2 (7.9%)	Unknown (highly variable)	Expected lower participation of Indigenous people in workforce

Appendix 5: Current situation full output

Wellbeing category: A feeling of safety [safety, feeling safe and secure]

Question addressed: What are the things that make you feel safe or not safe on your country today?

Safe	Not safe
• Rainbow serpent • Family makes you feel safe • Liyan, makes you feel safe, gives you a warning sign … We just feel it [a danger], don't see it, turn and walk away… Sixth sense makes you feel it, walk away, then you see a snake • Feeling of being safe on country – liyan, spirit • Healing from country, you site, go to the river • Country makes you feel better • Driving safely • Housing makes you feel safe, having your own space • Having control of you own space, who comes and goes, make you feel safe • Clean communities, not smashed glass • Communities in good repair, not damaged • Community solidarity for FASD, joining together, such a big issue • People working together makes you feel safe	• Locked gates that keep you out of country make you feel unsafe • Pastoral, station mob, don't make you feel safe • Kartiya who lock you out of country make you feel unsafe • People trying to make money from our country • When living waters drop, people get worried • If we have no river, don't feel safe • Can't get to places, trees grown over • Cane toads, people worried about food, goanna • Cane toads, we can't drink our own water now from the river • Turkey – full of cane toads – people scared to eat it, makes you feel unsafe • Water changing colour, at neap tide, water is blue, changed, always used to be brown, muddy • Seeing jellyfish in the water, changed, didn't used to be there, feel unsafe • Green water, we wonder how, it's always muddy • Climate change, seeing country change, makes people feel worried • Mining, coming over our ridge, level of worry, insecurity • Driving badly – so many accidents happen with kids in our cars • Losing a lot of kids, young girl murdered • Losing family makes you feel unsafe • Lots of people drinking and fighting • Domestic violence - unsafe

Wellbeing category: Knowledge of country and culture

Question addressed– what ways can you connect to your country and culture today?

- Rainbow serpent
- Camping, fishing, hunting
- Go and visit country, just sit, kids play, we explain things
- Bush tucker, plants, different plants for seaside, river, desert
- Plants connect, through all different plants for different country
- Telling stories about country and teaching them
- When you go to places for art, culture, you tell stories
- Dad tells us stories, passes on the stories
- Watch the changes to the water, changes to the country
- Watch for when the conkleberries are going to come
- Make spears, collect conkleberries
- Look after country and it looks after you
- Living waters, billabongs, still there, never go down
- When young woman becomes a mother, everything goes down into the water
- When you go fishing, we always leave a cooked fish, food for the old people on country
- Old people give us fish on country, so we give it back
- Law connects us to country, rules for what we can eat/can't eat
- Old people tell us, gather only enough to eat, leave food for the next time, don't be greedy
- Getting medicine plant, boiling them
- Go the mangroves, get shells, teaching my kids on country
- Songline is very important
- Song, connect through songlines, corroboree, dancing
- Art, corrobboree, songs, they tell the story about places to our kids
- Artefacts, boomerang, story is told through that spear
- Coolamon, how to carry a baby in a coolamon, grandmother made it, taught me
- Taking kids out to country, our Yurriyudum Taam working group – connecting back to country
- Animals teach us things – kangaroos won't drink dirty way, dig a little furrow for water to run in with leaves, strain it
- Country is alive and holds memory – it knows us and we know it
- Sacred sites from my area – and massacre sites
- Sharing history with others
- Also massacre sites, history, we know what happened and where it happened
- Going to meetings about country and culture
- Getting our native title
- Language connect us – still talk with my granddaughter
- Language, different places got different name
- Teaching language in schools, skin group, names, so they can carry it on, learning from us
- Connect through people, ancestors where they have been born
- Skin groups connect us to country

- People connect from totem, make you connect to your country
- My dad been telling me stories for Nookanbah
- Film about us marching, at Nookanbah, to connect to country, protect our sacred site
- People came to Nookanbah to protect sites
- Meat works in the bush (in the past)
- Mallagee, a special thing that has power, like we have a rock that you rub when you go fishing, I feel connected with all the other people who have rubbed that rock
- Going back to country, in 87 went to Mornington, now went back, it's so different, saw my dreaming

Wellbeing category: Strong family and community relationships

Question addressed: what are the ways that you connect to your family and community today?

- Camping and fishing, family catchups
  - Can be just as a family or might be aligned with a bush meeting arranged by an organisation, e.g. land council or ranger group meeting
  - Can get a government lease or concession to allow traditional / cultural activities including hunting and lighting fires
  - Creating memories – fostering cultural identity and connection
- Connection to country maintains cultural links to country, identity, family, past and future, ancestors
  - Taking family to country, teaching and learning culture on country
  - Lack of access to country can prohibit activities which maintain cultural connection to county, family
  - Dry river prevents teaching and learning, passing on knowledge
- People (family and community connections) are impacted when the river and country is damaged – whether by humans, animals, pollution etc
  - Lose the ability to teach kids
  - Impacts on knowledge about culture and country
- Connection to country, visiting special / important places – links to the country that sustains your ancestors and will sustain future generations
- Sense of responsibility for country and culture, being impacted by things out of our control. E.g. 25 years into the future if the river is dry as a bone because of poor development family and connection will be destroyed. If it is ruined while during the time that we are the elders and it is our responsibility what will we be able to tell our kids and grandkids?
  - Sense of responsibility to future generations

Wellbeing category: Fun – recreation, leisure

Question addressed: What sorts of things do you do to have fun today?

- Country gives you grounding, knowledge, ideas, identity
- Going back on country gives a feeling of Belonging, Love, Happiness, richness
- Country calls you back
- Metaphysical feelings, empathy with country (feeling hurt when country is hurt, feeling strong and good when country is healthy and being looked after properly)
    - Solastaligia [actually solastalgia] – nostalgia for country when you can't access is
    - Solisfeelia [actually soliphilia] – happiness, fulfilment from country when you visit it
- Keeping knowledge and protocols alive

Facilitator notes: Started with family and community, people talked about bush camps etc as important opportunities for connecting with family, practicing cultural and traditional activities, intergenerational teaching and learning knowledge. However, the conversation kept coming back to restrictions on the ability to continue these activities, e.g. lack of access to country (locked gates), dry/damaged river and ecosystems, waiting for externally driven opportunities (e.g. bush meetings).

Changing the conversation to fun/leisure brought out more positive responses in terms of people's relationships to country. What country gives them.

Wellbeing category: Places and things that make you feel good [aesthetics]

Question addressed: Are there special places and things that make you feel good when you see, touch, taste, smell, or feel them?

This category was not one the group related to. However, the following points are noteworthy:

- The country looks beautiful. [This was Zac's response to Ken in a one on one conversation to the side of the group, it was the only thing that Zac could link to the category of 'beautiful places and things.]
- Ken asked the group about their favourite, best-looking car to see if the two younger men (Alistair and Zacharia) in the group saw a particular car as beautiful – but the response (from Alistair) was "a landcruiser" as a favourite car. Ken also asked Ronnie (a musician) whether a guitar could be beautiful, but without response. Interestingly, during a plenary session, Ken mentioned that in his youth he thought the new Monaro was a beautiful car, and their 2-3 affirmatory comments from the Indigenous participants.

Wellbeing category: Inner peace, spiritual fulfilment

Question addressed: How do you keep your Liyan strong today?

A point returned to a number of times by Mervyn was that going back to the early days when all language groups existed together, this provided connection, and everyone shared/cared. Loss of language and connection between language groups was a major issue and affected the capacity of groups along the river to interact effectively. During the session one solution

proposed was that language should be taught to children in schools. In a later conversation with Alistair, he pointed out that there were important sites along the river, and that particular people knew the songs for these sites and sang the songs to maintain the river. This links closely with Mervyn's comments, and the connection of knowledge/language, and care/communication, down the river, and connection to inner peace, spiritual fulfilment.

Connection with country was a central theme to inner peace-spiritual fulfilment and returned to in various forms. Following are the other comments recorded during the group discussion.

- The river brings life to the Kimberley.
- Sand is good for sleeping, camping. Good for stories and connection to the land. [There was a sense of loss involved here, and initially it was unclear whether the sand was no longer as good, or issues related to access, but see the next point.]
- Sand now shifting so not so good for camping. Camping in river on sand with family/community, under the milky way, was an opportunity for old people to pass knowledge down to the young people.
- More recently there has been a lack of big floods so pools not cleaned out, and pools lost. Sand has been pushed into and filled some fishing holes.
- Survival and leadership program for the children was needed to pass on knowledge.
- A good approach would be to involve young ones in taking tourists along the river, sharing knowledge with others.
- Being at the river is healing.
- Camping out fishing.
- River dancing is maintained, "That's what kept it alive" a way of connecting with country.
- Good feeling when you see the river rising and running – flooding.
- The living water still exists.
- Groundwater has dropped in recent times.

Wellbeing category: Enough food and water

Question addressed: How do you get your food and water today?

Water: today many people take drinking water from home/camp (bottled) when going out bush because many rivers are polluted from cattle on the river (mainly) and to lower extent pigs; dirty and not running (green, full of algae) water is not safe to drink, will make you sick; some people do drink from river, some parts are clean, e.g. people still get water by digging in the sand; spring water is important but there is concern there is not enough spring water, less water because of drier conditions; dry country + erosion also affect water purity; water (e.g. billabongs) is also very important for animals that they use, such as those living in water (e.g. fish, cherabin, turtles), but also many animals rely on water or animals [prey] living in water (e.g. bush turkey, goanna)

> *"When we go on our food, we don't drink/have river water today; we take our own bottled water from the camp because river water is finished… when you drink water you might get sick"*

> *"Not enough spring water… country looking really dry because of lower rainfall last year; for the Fitzroy to be empty like that happened 30 years ago"*

"We can see the dust storms building right now… country is looking really dry… cattle is not doing good for country… leads to erosion"

Food: people mainly rely on getting their food from supermarket, but regularly get food from the bush/rivers. Drier rivers mean less fish, less often. Wrong way fire reduce the abundance of bush food and feed for animals that are important for hunting, such as bush turkey. Bush food seems to be less abundant because of climate change. A major problem is access to stations (essentially to non-Indigenous stations); very important limiting factor for people getting food on country (not only access, but how and when). People need to call stations to ask for permission, but it's not easy and they need to leave before dark and it's getting harder to get permission anyway. People are aware of important activities (e.g. mustering) and would avoid interfering anyway.

"Because river is running dry, people are catching too much"

"Waters are getting too small" "If we don't get any flooding this year, we may not get any [fish] next year"

"Because of climate change there's not enough bush food"

"People want to gather their food using the traditional way of hunting"

"Before you on hunting, you need to ring [stations]" "…if the muster is finished, then you can go"

"In Aboriginal stations we can go anywhere… get our food, look after our country"

Wellbeing category: Healthy country, healthy river

Question addressed: What are the things that are healthy and unhealthy about your country today?

Wrong way fire: participants identified 'wrong way fire' as an important concern affecting the health of the country today (sometimes started by tourists); this refers to ensuring fire happens at the right time (e.g. early in the season, checking when rain will come), the right way (e.g. following protocols, protecting places and avoiding sensitive areas like riparian vegetation important to provide shade and maintain areas providing bushfood), and is done by the right people (i.e. traditional owners).

Dust storms: participants also identified dust storms associated with plan areas, particularly eroded areas and areas with little vegetation cover (e.g. due to mismanagement) as a problem in the catchment (mainly plains country); however, they noted this was of particular concern earlier (e.g. 60s and 70s), but that could become a problem again today; also related to wrong way fire that leaves country exposed

"We can see the dust storms building right now… country is looking really dry… cattle is not doing good for country… leads to erosion"

Dirty river: people are concerned about the amount of rubbish left behind by people visiting the river, which affects the way people enjoy and use the river today

Overfishing: people are concerned about some people taking too many fish or catching big fish (e.g. taking big barramundi, breeders, before laying their eggs) because it will affect others taking their fish; this has become more problematic because in some areas there is less/lower water, which means less habitat for fish (i.e. less fish) and fish aggregate in some areas, which makes it easier for people to overfish

Wellbeing category: Satisfying work, meaningful work

Question addressed: What are your opportunities for meaningful work today?

- *"You don't get much people out in the country"*
- *"Because of technology (motorbikes, chopper), people stay in town, less station work"*
- *"Ability to get hired is hard [in non-indigenous stations]"*
- *"Not enough trust in Indigenous people"*
- *"They don't give us the opportunity to work on stations"*
- *"[Some industries, like mining] have taken some of our mob from our own areas"*
- *"It's about living on country"*
- *"Have opportunities to taking people to bush, to teach language"*

Pastoral/agricultural: participants identified working on country (e.g. in stations) as an important and meaningful occupation, but noted that several aspects are affecting their participation in these activities, including: it's getting harder to get people back to work on stations (e.g. younger people are less interested)

Rangers: participants identified the activity of rangers as a meaningful and important occupation today, but noted that there are limited (and unreliable) resources (e.g. funding) to support ongoing ranger activities

Arts: participants identified the creation of art (e.g. paintings, carvings) as an important occupation today, but noted that it requires people living in or going out/being on country because people create art about is their country, their own dreamtime stories, spirits; people also need to obtain materials from country to create art (e.g. boomerangs); for these reasons having access to country is very important and currently there is constrained access (e.g. locked gates)

Mining: participants identified working in mining as one possible occupation, but noted that many times jobs are taken by people from outside (mainly FIFOs working in the industry)

General remarks relevant to all jobs:

- Increase in the use of technology for production means less people are needed, less jobs
- Native title makes it harder for people to be hired, particularly in non-Indigenous stations (more people from outside the region are being hired instead)
- Hiring people requires trust between employees and employer (currently weakened)
- There seems to be less on-country work and more people depending on Centrelink
- There is not appropriate/sufficient training, which is needed to access available jobs (e.g. more technical works requiring specific skills like mining)
- Programs that support on-country training and provide opportunities to go to the bush are important and very meaningful occupation (e.g. led by Elders teaching younger people)

Appendix 6: Workshop evaluation

At the end of the workshop, participants were given an opportunity to comment on the usefulness of the wellbeing categories, and also to suggest improvements to the workshop. Responses to the standard questions were captured through facilitated group discussion, with the facilitators reporting on group evaluations. These evaluations have been summarised in the table below.

Workshop question	Summary of participant comments	Responses from the research team
1. Are there any views/aspects of wellbeing-liyan that are not covered in our categories?	Missing aspects raised included: a. Customary law b. Relationships c. Skin relationships d. Sawfish dead in the gorge e. Need to focus on culture in 50 years, cultural alternatives need to be more obvious in the options – what is being gained or lost in culture? f. Water quality g. Relationships among all the living things in the ecosystem h. Revival, survival, maintenance and management of all nature's creation alongside people. i. Housing.	These comments are all important. Concepts outlined in, e.g. Wallace (2012) and Wallace and Jago (2017) embed the concepts used in a systems approach. Some aspects, such as those relating to customary law and skin relationships, are covered in the concept of 'principles' (Wallace and Jago 2017, Wallace et al. 2020). Others, e.g. those relating to threatening processes, would be dealt with in a full planning process (Wallace 2012). These matters were partly outside of the scope of the assessment as it currently stands. Nevertheless, they could be incorporated in a longer version if more time had been available.
2. In assessing the scenarios, which categories of wellbeing-liyan did you <u>not</u> find useful?	None of the categories were considered 'not useful', although there was a suggestion that 'safety' was too broad and should be split or made clearer. There were comments again concerning the failure to deal with the whole ecosystem and relationships with the Rainbow Serpent. Also, a range of valuable general comments including: a. Need to protect special and unique ecosystems b. Problem with repeating in the north the mistakes made in the south c. CSIRO science is biased by government interests d. TOs need opportunity to do research that meets their priorities e. Intergenerational equity is an issue, young people need an opportunity to participate.	All valuable comments. Intergenerational equity, particularly engagement of younger people, is a challenging but important issue.
3. Any other suggestions to improve the assessment or workshop?	Range of general points mentioned including: a. Need to put water on the tables for workshop participants b. Billabongs, climate change, and change in general need to be discussed, as do risks with agriculture such as poisons c. Agent Orange issues d. Number of important comments about improving the process – e.g. more pictorial presentations and focus on group discussions, etc.	Suggestions concerning the running of the workshop were very useful and incorporated, in some form, into the following workshop in Broome – which resulted in a better second workshop with regards to presentation etc. Other comments are covered above.