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INFFER Project Assessment Form (PAF) Instruction Manual (INFFER step 3)

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Contents

Introduction

The purpose of this guide it to assist project developers to complete the INFFER Project Assessment Form (PAF). The Project Assessment Form is completed on-line. For instructions on accessing the electronic PAF website, see the separate document "Instructions for INFFER's electronic Project Assessment Form (INFFER step 3)" which is available on the INFFER web site, www.inffer.org.

The information in this document is available within the PAF web site, either in the main part of the site, or in one of the help buttons provided for each question (Details, Example Answers, Relevance and Frequently Asked Questions). This document provides a convenient compilation of all that information into one place.

The PAF is step 3 of a comprehensive process, extending from initial identification of natural assets for potential investment, through to monitoring and evaluation of funded projects (Table 1). It is designed to provide a detailed feasibility assessment of the assets identified as good prospects for investment in steps 1 and 2 of INFFER.

Table 1. Steps in the INFFER process

	Description of Step	**Relevant Document**
1.	Develop a list of significant natural assets in the relevant region(s)	"Significant Asset Identification Guide"
2.	Apply an initial filter to the asset list, using a simplified set of criteria	"Filtering Significant Assets Prior to Detailed Assessment"
3.	Define projects and conduct detailed assessments of them	"Project Assessment Form", and "Project Assessment Form Instruction Manual" (this document)
4.	Select priority projects	"Selection of Priority Projects"
5.	Develop investment plans or funding proposals	"Development of investment plans or funding proposals"
6.	Implement funded projects	"Implementation of funded projects"
7.	Monitor, evaluate and adaptively manage projects	"Monitoring, Evaluation and Adaptive Management following INFFER Assessment"

INFFER provides guidance about steps 1 to 4 and 7, and the output of INFFER provides information needed for steps 5 and 6.

The INFFER Project Assessment Form (PAF) form serves three purposes:

(a) It supports the development of a project to protect or enhance a natural asset. If the form is followed closely, the project will be internally consistent, meaning that the works specified will be consistent with the project goal, the project interventions will prompt sufficient adoption of the works, and the costs will accurately reflect the project interventions. Internal consistency is crucial so that the project can be accurately and fairly assessed. If the form is used to assess an existing project, then it provides a test of whether that project is internally consistent and, if not, it highlights where the areas of inconsistency are.

(b) It collects and processes the information needed to use the Public: Private Benefits Framework to identify the most appropriate type of policy mechanism for the project.

(c) It collects comprehensive information in a form that allows the project to be assessed. Using the Benefit: Cost Ratio, the assessment asks, how substantial the benefits of the project are relative to the costs. Benefits may be tangible (e.g. financial benefits) or intangible (e.g. some environmental benefits) or both.

The thinking behind this step

The Project Assessment Form is designed to be as simple as we can make it, while being sufficiently comprehensive to provide an adequate assessment of the alternative projects. The response to each question is simple – often just a score from a five-level scale.

The information is collected in a logical order. The answers to later questions often depend on the answers to questions earlier in the form, as shown in Figures 1 and 2.

Figure 1. Simple flow diagram of the INFFER Project Assessment Form.

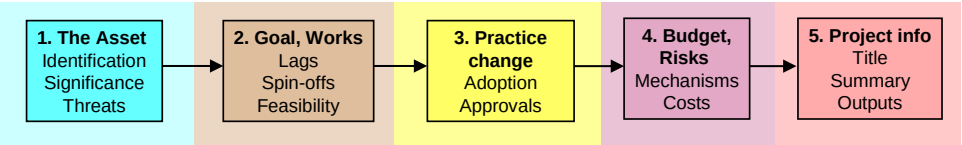


Figure 2. Detailed flow diagram of the INFFER Project Assessment Form*.

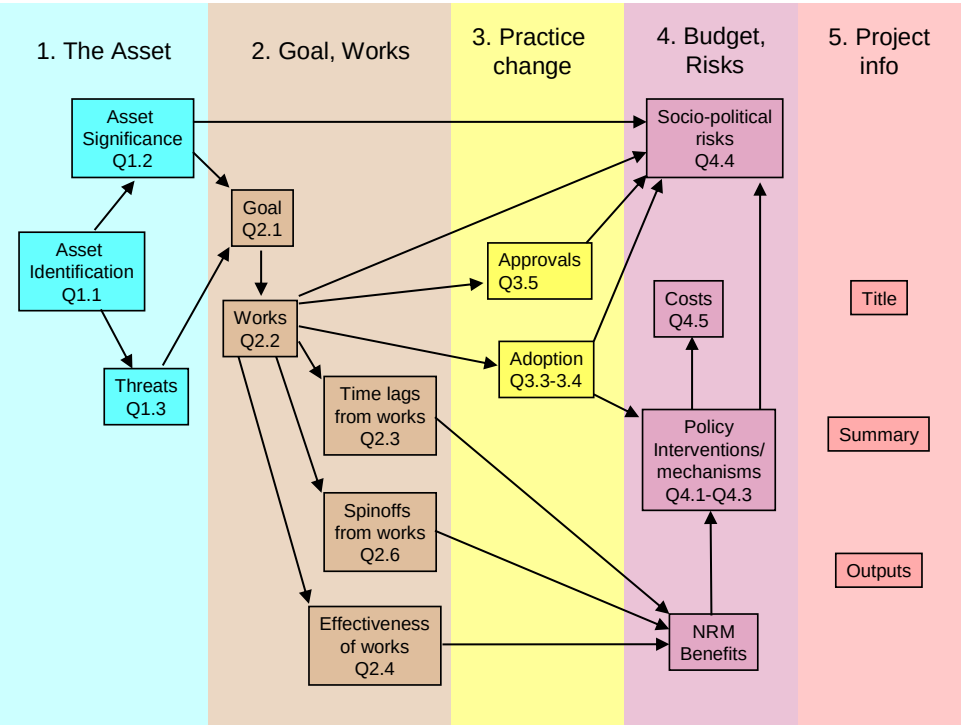


Figure 2 includes all the main elements of the assessment, but omits some minor elements.

The information collected in the form is integrated in a very precise way to evaluate the value for money from each project. The questions are designed in a particular way to feed into the calculation of a Benefit: Cost Ratio, and that index is designed to be highly consistent with the logic and rigour of a Benefit: Cost Ratio calculated in a Benefit: Cost Analysis. The main difference between INFFER and a Benefit: Cost Analysis is that we do not usually attempt to quantify benefits in dollar terms (although if asset value was estimated in dollar terms, then the INFFER Benefit: Cost Ratio would be exactly equivalent to a Benefit: Cost Ratio).

FAQs

Throughout this document we refer to Frequently Asked Questions (FAQs) that are relevant to particular questions in the PAF. The FAQs are embedded within the PAF, but are also available collated in a separate document at www.inffer.org. Each FAQ is numbered and they are referred to here by those numbers.

General: 1, 2, 3, 4, 5, 6, 7, 8 (i.e. see FAQ numbers 1, 2, 3, etc.)

What INFFER can and can't do: 31, 32, 33, 34, 35

How does it work? 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77

Who is the audience for the form?

We see four audiences for the Project Assessment Form.

(a) The people completing the form. In its role as a project development tool, it provides feedback to these people about the internal consistency of the project they have defined, and about the relative value for money of that project.

(b) Strategic decision makers within the organisation. They may find the Project Assessment Report to be sufficient for decision making purposes, but they may also wish to examine the complete form.

(c) External funding agencies. Most funders will only examine information provided on their own funding proposal template. Proponents using INFFER would transfer information from the PAF into that template. Some funders with knowledge of INFFER may wish to access the complete PAF.

(d) Reviewers. Audiences (b) or (c) may require proposals to be reviewed by experts in relevant areas. Access to PAFs would assist these reviewers, especially where relevant information is not asked for in the standard proposal template for a funder.

Section 1: The Asset

1.1 Asset identification

On the INFFER web site (www.inffer.org), there are separate documents to provide guidance on identification of assets ("Significant Asset Identification Guide (INFFER step 1)") and on "Filtering Significant Assets Prior to Detailed Assessment (INFFER step 2)".

In defining the asset it is best to focus on those elements that you actually intend to address in the project. If you are going to do work to improve one component of a larger system (e.g. one river reach) it is better to tightly define that area as the asset, rather than the whole system. For example, the asset might be defined as a whole river, as a particular reach of the river, or a threatened species of fish within the river. You *could* define the whole river as the asset, but your goal will presumably only relate to the one river reach, so it probably helps with clarity of communication and clarity of thinking to define the asset more narrowly.

Depending on how you define the asset, the goal may vary, management actions will vary, the feasibility of the goal will vary, and so on.

FAQs

The following FAQs relate to asset identification: 101, 102, 103, 104, 105

(a) Name of asset

Where does this information get followed up?

Q1.2 Asset significance, where we score the significance of this asset

Q1.3 Threats, where we identify the threats relevant to this asset

Example

York Plains Wetlands

(b) Brief description of asset

Give the location of the asset.

Specify the type of asset e.g. river reach, wetland, area of native vegetation, a site of cultural significance, agricultural land in an area, a threatened species, etc.

Provide the physical dimensions of the asset, e.g. 300 ha, 10 km river reach. Where the asset identified is dispersed over a large area (such as some threatened species or ecosystems, or an area of agricultural land), include the overall area over which this asset is dispersed.

Example

The asset consists of eight wetlands and Avon River Reach 46 and covers an area of 3500ha.

The asset area is made up of 89% (4,590ha) of private land holdings, 6% (329.15ha) of public land and the remaining 5% (253ha) is licensed crown land.

The land use in the asset area is largely sheep grazing on areas likely to be occasionally flooded from large rainfall events, and cropping on the higher ground (approximately half the area). In the recent dry years, cropping has occurred on some of the lower floodplain country because it has dried out sufficiently to enable cropping practices. (Source: Lindsay Ezard, DPI extension officer)

There are nine commercial farmers carrying out mixed farming (cropping and grazing) in the asset area. Most of the properties are stable landholdings supporting long-time family farms. (Brown M, (2008) *Community values of natural assets in the North Central CMA region,* Scarlet Consulting)

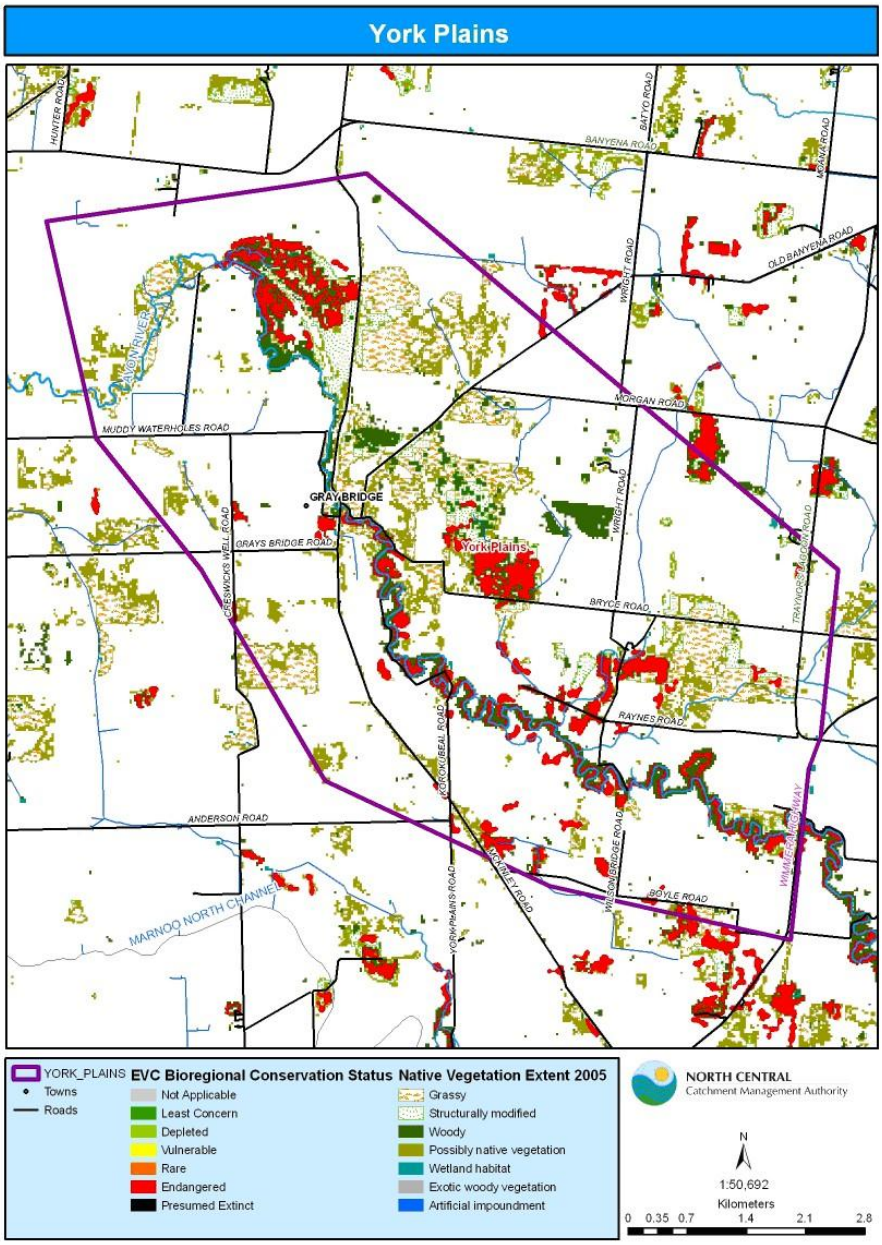
The York Plains asset area is characterised by alluvial, almost level plains and low rises, dissected by the Avon River and minor tributaries. The area is heavily grazed and cropped. Small remnant populations of red gum (*E. Camaldulensis*) remain along the watercourse and in swampy depressions. (Land Conservation Council Victoria (1978) *North Central Area Investigation Report*.,Land Conservation Council, Melbourne)

The asset area geology comprises Quaternary alluvial deposits of sand, gravel, silt and clay along the Avon River, overlying earlier Pleistocene alluvium (Shepparton Formation). In turn, this overlies Pliocene sands. The asset area lies on the eastern margin of a large area described geologically as the Loxton Parilla sands, which covers the Murray Basin. (Turnbull J (2009) *Cultural heritage assessment, Patho Plains and Avoca Marshes York Plains Asset Areas – A draft report to the North Central Catchment Management Authority,* Ochre Imprints.)

(c) Map of the asset

Example

See below for detailed map of the York plains asset area with the EVC Bioregional Conservation Status Native Vegetation Extent 2005 layer overlayed.



(d) Select a benchmark condition for the asset

The benchmark will be used as a point of reference when you value the asset (Q1.2(b)) and when you quantify the impacts of works (Q2.4(a)). Briefly describe the benchmark condition.

Various benchmark conditions can be defined. We suggest that you use the condition that the asset would be in if all of the goals for this project were fully achieved.

If you are assessing more than one project for this asset and they have different goals, it is important to use the same benchmark condition for all projects. We suggest using the condition that would result from successful achievement of the most ambitious set of goals.

To avoid some complications, the benchmark condition should be at least as good as the condition expected to be achieved following the most ambitious project for this asset.

Where does this information get followed up?

The benchmark will be used as a point of reference when you value the asset (Q1.2(b)) and when you quantify the impacts of works (Q2.4(a)).

Example

The benchmark condition is the condition if the SMART goals for this project (specified in Q2.1) are achieved.

FAQs

108, 109

1.2 Significance of the asset

(a) Describe the values of the asset that make this an important project (i.e. what makes the asset significant?).

Focus on key values, not an exhaustive list. You may wish to break down values into the following categories.

- Community value – e.g. amenity, philosophical, spiritual, or recreational value.
- Environmental value – e.g. intrinsic, scientific or educational value. These values may be influenced by considerations such as species richness of an area, rarity, distinctiveness, representativeness and the current level of disturbance or degradation of an asset.
- Economic value – e.g. consumptive use (water resource), or productive use.

Example

Community

It is highly valued by the local community for its indigenous and European cultural history and significant aesthetic value.

The York plains asset area is situated on the Avon River, which formed the boundary between the *DjaDja Wurrung* and *Jardwadjali* language groups. (Clark, I.D. (1990) *Aboriginal Languages and Clans: An Historical Atlas of Western and Central Victoria - 1800-1900*, Dept. of Geography and Environmental Science, Monash University, Melbourne.)

Very significant indigenous sites (burial, and the largest stone scatter recorded in the catchment) and a history of permanent existence by the traditional owners of the land exists along the Avon River.

The findings of a cultural heritage report conducted in 2009 denoted the sensitivity of the York Plains asset areas as the following (Turnbull, J. (2009) *Cultural heritage assessment, Patho Plains and Avoca Marshes York Plains Asset Areas – A draft report to the North Central Catchment Management Authority*, Ochre Imprints, Melbourne.):

- High European cultural sensitivity: The area immediately surrounding the York Plains homestead site has high archaeological potential. Subsurface remains of the homestead such as foundations and artefacts will exist in this location. The extensive artefact scatter provides a wealth of historical information.
- Low to Medium European cultural sensitivity: The remainder of the asset area has low potential for historical sites. Isolated homestead sites and features associated with rural activity such as machinery or fencing may exist, however the area has been sparsely occupied in the past.
- High indigenous cultural sensitivity: Area surrounding known sites and associated wetlands, these sites contain Aboriginal cultural materials.
- Medium indigenous cultural sensitivity: Avon River margin
- Low indigenous cultural sensitivity: Plains region

It is the last remaining significant stand of significant vegetation within this area and is highly valued for this reason by the local community. The presence of a major lunette system adds to its cultural values.

Environmental value

These wetlands provide important biodiversity values in a highly modified agricultural landscape.

Ecological Vegetation Classes (EVCs) and conservation status in the Wimmera bioregion:

- Plains Woodland (Endangered)
- Lignum Swamp (Endangered)
- Red Gum Swamp (Vulnerable)
- Plains Grassland (Endangered)
- Cane-grass Wetland (Vulnerable)

Threatened flora species – Turnip Copperburr (nationally endangered), Buloke Mistletoe (VROT), Buloke (FFG listed), Chariot Wheels *Maireana cheelii* (nationally vulnerable)

Threatened fauna species: Brown Treecreeper, Hooded Robin (Cheers, G., Cheers, B. (2008) Ecological Assessment – Coates Property Grays Bridge, Cheers Flora and Fauna Consultants, Havelock.)

The York Plains are bioregionally significant. Importantly they are located close to the Creswick Swamp, which is on the register or state/national significance. York Plains are in fact of higher environmental value than the Creswick Swamp, containing similar

threatened species, as well as being in much better condition. The only reason it is not on a 'list' of more environmental status is due to the York Plains being predominantly on private land.

Economic

The York Plains have economic value largely for the local community - water for stock, vegetation for grazing, tourism, lucerne grown along the river.

Most of the properties are stable landholdings supporting long-time family farms. As with other landholders in the region, these farmers have been responding to the on-farm impacts of drought for more than ten years. An estimated 50% of these landholders are past participants in natural resource management works.

(b) Overall significance of the asset

Provide a score to represent the significance or value of this asset (*V*), for calculation of the Benefit: Cost Ratio later.

V [ ]

Asset significance or value encompasses environmental, social and economic values, to the extent that they are relevant. It can include public and private values of the asset(s) that the project aims to protect or enhance.

In selecting a value score, consider your responses to questions 1.1 and 1.2(a). Assume that the asset is in good condition. Use Table 2 as a guide. The scoring system has been calibrated to give an asset of very high national significance a score of 100.

To estimate the relative benefits of different projects it is important to be able to express the values of the different natural assets. Currently there is no agreed system to value assets at either a state or national level. We are having discussions with some state government agencies to assess their interest in developing such a system.

In the absence of an agreed asset valuing system, we provide a simple scoring system for use in INFFER (see Table 2). This system enables projects to be compared within a region, within a state or nationally.

Table 2. Guide to scoring V for different types of assets.

Asset significance	**Example**	**V**
International significance	Great Barrier Reef Kakadu Lord Howe Island Tasmanian wilderness	Greater than 100
National significance	The Gippsland Lakes The Coorong Wetlands Kosciusko National Park Ningaloo Reef	50 to 100

	Victorian Alps Grampians National Park Great Ocean Road hinterland Macquarie Marshes	
Very high state significance	Fitzgerald River National Park Western Port Bay Wilsons Promontory Gunbower Island/Murray reaches	25 to 40
High state significance	Lake Warden (a Ramsar wetland) A nationally endangered species of large bird Victorian Volcanic Plains grassland ecosystem Lower Ovens River and floodplain	15 to 25
Moderate state significance	A highly valued estuary Whole rivers (e.g. Loddon)	5 to 15
Regional (catchment) significance	Threatened species of regional significance A regionally significant wetland A river reach of moderate importance A very important local wetland 10,000 ha of high-value land	2 to 5
Local significance	A locally valued wetland or creek	0.1 to 2

If a particular user has their own quantitative system for valuing assets, it would be possible to use this in place of the system in Table 2. For example, it would be possible to use non-market valuation (i.e. dollar values) in place of the scoring system proposed here, although that is probably not practical to do so for the large number of assets that need to be assessed.

Alternatively, a different scoring system might be agreed within the organisation. This could be substituted for *V*. However, the following should be noted.

- The scoring system must be quantitative;
- Care should be taken to ensure that it is logical and internally consistent;
- Use of your own system for specifying *V* will mean that the resulting Benefit: Cost Ratio values will not be comparable across different organisations. That may be fine for your purposes.
- Use of your own system for specifying V will mean that you cannot use the threshold level of 1 to indicate which projects will generate benefits in excess of costs. You would be able to compare BCRs between projects, but not to any specific threshold level.

If INFFER is being used to assess projects that will be submitted to external funders, we recommend using the standard INFFER scoring system, to minimise the risks with comparability and consistency.

If the asset for this project is defined as a proportion of a larger asset, scale down the score accordingly. For example, if the entire asset would have a score of 50, a project focussed on protecting half of the asset might have a score of 25 (assuming that all parts of the asset are equally valuable).

If an asset is even more significant than "very high national significance", a score greater than 100 can be provided. For example, this might apply to a project that addressed the Great Barrier Reef in its entirety (e.g. it might be scored as 1000).[1]

Estimation of asset significance may be influenced by:

- assessments by experts from government agencies (e.g. scientific assessments, national or international reports or lists)
- assessments by community members, through participating in workshops or being otherwise consulted
- assessments by environmental managers
- non-market valuation studies (surveys to assess the dollar value of an environmental asset) could conceivably be done as well, although that is probably not practical to do so for the large number of assets that need to be assessed.

In considering different scores for your asset, note that each point represents $20 million so a score of 100 corresponds to a value of $2 billion. If you wanted to value the Great Barrier Reef at $5 billion, you would give it a score of 250 points. If you felt that a local asset was worth $5 million, you would give it a score of 0.25 points.

Note that, if the asset is defined to be very large, the goal for the asset (Q2.1) will have to be much more modest in scale, to reflect what is realistically feasible. Thus when the project is assessed using the Benefit: Cost Ratio, the higher value of large assets will be countered to some extent by the lower feasibility of managing them at that large scale.

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report.

It is relevant to the consideration of socio-political risks (Q4.4).

Example

3 (An asset of high local significance and some state significance)

FAQs

106, 107

[1] Note that the scoring scale has been changed since earlier versions of INFFER. Previously we allocated a score of 100 to the entire Great Barrier Reef. The change is an attempt to prevent people from over-scoring relatively small assets, which seemed to occur often in the previous system.

(c) Provide the rationale for the score you provided at (b)

Example

> From the information provided above, York Plains Wetlands are clearly of high local significance. Until recently they were not known to state agencies and so are rated here as being of only some state significance. They are not widely known outside their local area.

1.3 Key threat(s) to the asset.

Indicate key threatening processes that are affecting the asset, or are predicted to affect the asset. For each key threat, briefly note its underlying cause and its impact on the asset in broad terms.

Key threat and underlying cause	**Impact on the asset**

If necessary, expand table to include additional key threats.

Where does this information get followed up?

> It underpins the response to Q2.4, which quantifies the effectiveness of the specified works and on-ground actions at reducing these threats.

Example

Key threat and underlying cause	Impact on the asset
Habitat destruction caused by overgrazing of wetlands and associated remnants by sheep	Very high impact. Overgrazing will lead to continued loss of understorey and prevent recruitment of key species. Wind erosion will continue especially if drought conditions prevail. Regeneration of red gum will occur if overgrazing is ceased.
Habitat destruction caused by opportunistic cropping	Medium impact. Landholders around the area are production focused and in a dry year will utilise the lower lying areas for opportunistic cropping. Although willing, landholders are unable to change from production focus without other options being presented. Cropping leads to introduction of cropland weeds (e.g. Spear Thistle), relinquish part of the native seed resource and introduces herbicide contaminants and nutrients. Cropping also disturbs indigenous relicts.
Salinisation caused by altered hydrological processes following clearing	High impact. Current watertables are less than 4 metres on the north side of the river but deeper on the area not subject to flood inundation. Whilst watertables have receded over the last decade from within 2 metres of the surface over much of the area, they pose a long term threat to the York Plains asset area, in particular the wetlands, native vegetation, Avon River and agricultural land. Salinity has already caused the death of Buloke trees and decline in the health of other native vegetation. It is evidenced in places by the presence of salt indicator plant species and by scalding from capillary rise in some areas. If the water table is close to the surface there may be a change towards salt tolerant species.

We suggest focusing on no more than three threats (those with the greatest impacts on the asset), but additional threats can be included if necessary.

Note that each of the threats indicated will require specification of appropriate management actions.

Table 3 provides a list of possible threats that you may use to guide your responses to this question. You may use alternative threat category descriptions if they suit your needs better.

Table 3. Suggested categories of threats.

Threat category	Threatening processes
Altered biogeochemical processes	Hydrological processes (e.g. acidification, inappropriate hydroperiod, salinisation, sedimentation)
	Altered nutrient cycles
	Altered climate processes
Impacts of introduced plants and animals	Environmental weed invasion
	Predation/herbivory by introduced species
	Habitat destruction
Impacts of problem natives	Expansion of native plant spp
	Predation/herbivory by native species
Impacts of disease	Dieback (e.g. *Phytophthora* spp)
Detrimental regimes of physical disturbance events	Fire regimes
	Cyclone regimes
	Drought regimes
	Erosion (wind and water, sedimentation, acid water, heavy metals)
	Flood
Impacts of pollution	Herbicide/pesticide use and direct impacts
	Entanglement in or ingestion of anthropogenic debris
	Spillage of oil and other chemical spills
Impacts of competing uses	Recreation management
	Agricultural impacts (other than as already dealt with above)
	Consumptive uses
	Illegal activities
	Mining and quarrying (including exploration)
	Hunting and collecting
	Harvesting of native species for production or consumption

1.4 Related projects

(a) What existing projects are going on, or have gone on in the past, related to the natural asset(s) being targeted by this project?

Where does this information get followed up?

It underpins the response to Q2.4, which quantifies the effectiveness of the specified works and on-ground actions at reducing these threats. If there are existing projects that are making a significant contribution to protecting asset quality, this should be reflected in the responses to Q2.4.

Example

The York Plains project 0708 NCCMA Investment Plan – strategic linkages

- 15 km of fencing of remnant vegetation – within riparian zones
- 15 ha of revegetation with indigenous vegetation – within riparian zones –

Lindsay Ezard pers. comm. and mapped into Catchment Activity Management System (CAMS).

York Plains project 0809 – continuation of previous year's activities

- 14 km of remnant vegetation fenced – within riparian zones
- 10 ha of indigenous revegetation – terrestrial zone
- 150 ha non-indigenous (lucerne) revegetation – terrestrial zone

Asset condition monitoring – Electromagnetic surveys have been used to highlight prevailing soil moisture and nutrient conditions. They were conducted over 1982 ha of the land that has major hydrological influence. Initial benchmarking Flora and fauna investigations on each of the 8 key wetlands are to be undertaken by Garry Cheers (flora and fauna consultant).

(b) Comment on the success or failure of these projects. How are you building on past work?

Where does this information get followed up?

It underpins the response to Q2.4, which quantifies the effectiveness of the specified works and on-ground actions at reducing these threats.

Example

The projects listed above have occurred within the direct asset area over the past three years. There has been a high level of success with tubestock planting (> 80% survival) and direct seeding (average seedling density of 10 plants/m) despite below average rainfall. Remnant and riparian fencing has successfully controlled stock access and reduced grazing pressure with some evidence of regeneration of native grasses and forbs. Lucerne establishment has been moderate to good (Lindsay Ezard pers.comm). Across the area of hydrological influence there has been limited establishment of perennial vegetation with new areas outweighed by additional cropping, apart from a significant area on the Duxson property (immediately south of the asset complex) where an estimated 600 ha is being progressively returned to a perennial native pasture based system following a history of regular cereal cropping.

How is the project building on past work? Over the past twenty years there has been significant research into the hydrogeological behaviour of the Avon-Richardson catchment including the York Plains area. There is now strong characterisation of groundwater flow systems in this landscape that provides some confidence that proposed actions will generate positive ecological responses for the asset. Implementation of the actions proposed have been occurring on a limited scale, but there has been strong community and extension engagement that provides a solid foundation for this project.

1.5 Knowledge gaps and quality of information for Section 1

(a) Note key knowledge gaps in Section 1 that may require additional research, analysis or investigation (e.g. about threats).

This relates to knowledge gaps on the part of the environmental management body, not the land managers or other stakeholders.

Where does this information get followed up?

It is reported in the Project Assessment Report.

Example

- Likely trend in vegetation condition under current management regimes
- Ability of degraded EVC's to respond to cessation of cropping and grazing impacts eg will they regenerate or will they need active restoration?
- Groundwater responses under future climate scenarios
- Duration of flooding on lucerne persistence on different soil types
- Sedimentation impacts on aquatic ecosystem components not well known

(b) Score the quality of information used to underpin your responses to Section 1.

Very poor Poor Medium Good Very good

1☐ ———— 2☐ ———— 3☐ ———— 4☐ ———— 5☐

1 = very poor information. Little or no information available.
2 = poor information. e.g. Some anecdotal evidence, but no local expert available.
3 = medium information. e.g. Judgement of a local expert based on limited evidence
4 = good information. e.g. Judgement of local expert based on some relevant evidence
5 = very good information. e.g. Highly relevant published scientific evidence.

Where does this information get followed up?

It is reported in the Project Assessment Report.

Section 2: Goals, works, technical feasibility

2.1 Project goal(s)

Provide one or more outcome goals for the asset that will be attained by this project. Each goal must be are specific, measurable, and time-bound.

"Specific" means that the goal is described in a precise and unambiguous way.

"Measurable" means that the goal definition is based on a variable which is able to be monitored and recorded reliably and economically.

"Time-bound" means that a particular date is provided by which time the goal will have been achieved. The time frame for the goal can be of any relevant duration.

The goals you specify should focus as much as possible on achievement of outcomes for the asset, not just activities or outputs. Many users find it practical to specify these goals over a time frame of about 10 years.

The goal may include a probability of success.

The specification of this specific goal is crucial to the whole process. It drives all that comes after. From here you will be specifying the works and actions that would be needed to achieve the goal, assessing the feasibility of achieving the goal with those works/actions, considering the adoption of the works, the choice of policy tools, and the cost of the project. All of that flows from the goal you specify now.

When selecting the goal, it is important to anticipate the technical feasibility of the goal (which implies paying attention to the causes of the threats), and the adoptability of works that would be required to achieve the goal. You may need to return and revise the goal later once issues like technical feasibility and adoptability are considered.

Setting the right goal is a balancing act. If you specify a goal that is very difficult to achieve (e.g. returning a large degraded asset to near pristine condition), the works required to achieve it will be much more extensive, much more expensive and much less adoptable than for a modest goal. If your goal is too challenging, then the INFFER process will highlight this, and you will either have to come back and moderate the goal, or set this project aside in favour of one with a goal that is more feasible. On the other hand, if you set the goal too low, the project will not be very attractive. You have to balance these tensions between the goal being do-able, and it being worth doing.

Where does this information get followed up?

It guides the selection of works and on-ground actions in Q2.2

FAQs

201, 202

Examples

- To increase the extent of native vegetation by 300 ha from 700 ha to 1000 ha by 2015.

- To increase the average habitat hectare score of remnant vegetation patches across the asset area by 10% by 2014. (Baseline habitat hectare data is available and has been used to develop this goal.)

- To lower the watertable to a depth of greater than 2 m (except for gross seasonal fluctuations in excessively wet years) over the capture zone (8,400 ha within and immediately surrounding the York Plains, as assessed by CAT modelling) by 2019.

2.2 Works and actions

The question relates specifically to works or actions that directly affect the asset(s), not to planning, extension, monitoring, payments to landholders, etc. that may affect the asset(s) indirectly. Such indirect actions (whether by the project itself or by other organisations) will be captured in Section 4.

In most cases, the responses to this question will be physical works or on-ground actions, but for some projects it may be changes in behaviour that don't involve physical works. An example of the latter would be a project that seeks to change the behaviour of visitors to a natural area, such as tourists caring better for a nature reserve that they visit. The key thing is that the question focuses on behaviours and actions that directly affect the asset.

The question is broken down into actions to be taken by (a) private citizens, (b) the project itself, and (c) other organisations responsible for natural resource management.

(a) Specify the works and on-ground actions that must be implemented by private citizens to achieve the specific goal(s) of the project (Q2.1). Document which private citizens would need to act.

The relevant private citizens may include, for example, farmers, hobby farmers/lifestylers, private businesses, extractive users of a resource, or visitors to a natural area.

Provide specific details of the required works and actions. Go into sufficient detail to inform later questions about the works' impacts, their likely adoption by the relevant people, and their costs. Give areas, lengths, volumes, and locations, as appropriate.

A mistake that some users make is to provide too little specific information about the works and actions.

In this question we are not assessing what it would take to have these things adopted. Assume for now that they can be adopted readily. Their adoptability will be assessed in Section 3.

In some cases, the physical actions required may be to <u>not</u> take certain actions: e.g. to not clear native vegetation, to not plant perennials where they will intercept valuable surface water flows, to not switch to a new management practice that is environmentally damaging in some way.

Example

> The project seeks to influence 16 private land managers across the capture zone with 9 in the direct asset area.
>
> Reach 46 of the Avon River has crown frontage held under grazing licence by adjoining land owners.
>
> **Habitat destruction due to over grazing**
>
> Stock removal from approximately 700 ha of remnant vegetation. Change current management from a set-stocking regime to a new agreed management regime which will maintain environmental benefits (habitat protection, strategic weed and rabbit control). In addition, an estimated 10 km of new fencing is required.

To maintain benefits associated with grazing removal it is intended to create 300 ha of new indigenous vegetation as a buffer around remnants and to improve connectivity between wetlands, riparian areas and other terrestrial vegetation (e.g. Buloke woodlands).

The above management means that a total of 1,000 ha of existing land would be protected from grazing. Landholders would be paid the opportunity costs (lost profits) for the loss of the grazing value from this land area.

Habitat destruction due to cropping

Within the total asset area of 3,500 ha there are an estimated 250 ha of wetland formation/Gilgai and 100 ha of cane-grass wetland potentially at risk from seasonal cropping. The required management response is to protect 350 ha land from cropping.

Salinisation due to altered hydrological processes

Considering all the available information from the modelling work of Beverly et al (2009) on the potential salinity interventions to protect the York Plains project area, it is likely that a combination of perennial vegetation options in approximately 8400 ha within and immediately surrounding the 3,500 ha of the identified asset area will deliver the target. These perennial options will be a combination of lucerne, native vegetation (natural regeneration and replanting) on approximately 50% of the capture zone. Whilst engineering is theoretically also an option, initial estimates of cost and political acceptability of disposal options, make it an infeasible option. Increasing the perenniality is based on the following indicative estimates:

- 700 ha of protected native vegetation – this is the current extent (covered as management response for overgrazing – threat 1).

- 300 ha of replanted native vegetation (presumably where it is most ecologically important and where landholders will be willing on the basis of payment, and covered as part of the management response for overgrazing – threat 1).

- 350 ha (Gilgai country and cane grass) protected from cropping (covered as part of the management response for threat 2).

- 3,500 ha of lucerne at any one time – Based on Ridley et al. (2001) it is assumed that there needs to be mimimum of 3 year lucerne and no more than 3 annual crops, followed by lucerne to achieve recharge control. In effect this means that 7,000 ha of land is protected from recharge by lucerne.

- Total area under effective perennial vegetation from the above management is 700 + 300 + 350 + 7,000 = 8,350 ha.

- Total recharge capture area = 8400 ha of which 800 ha is currently under lucerne

- York Plains asset = 3500 ha of which 700 ha is remnant veg

- After management actions are implemented there will be 1000 ha of native veg (30% increase) and 3,500 ha of land under lucerne (increased from 800 ha). Whilst only just over 50% of the capture zone will be under perennial vegetation at any one time, the maximum of 3 years cropping at any time followed by lucerne means

that effectively 8,350 ha is under effective perennial vegetation from a recharge control perspective.

This scenario has been developed on the basis that 7,000 ha within the 8,400 ha capture zone is suitable for lucerne. Whilst this is true in the current climate, approximately 50% of soils within the capture zone are flood-prone. Whilst this is not a problem in the current dry climate, and certainly application of gypsum has good potential for increased soil suitability, with this scenario there is a risk that if there are several major flooding years lucerne will not persist.

(b) Specify the works and on-ground actions that must be implemented by this project to achieve the specific goal(s) of the project (Q2.1).

This question relates to works that the environmental management body needs to do itself. Examples could include engineering works on public land, or purchase and renovation of degraded land. The question does not relate to indirect actions, like planning, extension, monitoring, payments to landholders, etc. even though some of these are intended to influence private citizens or other organisations. These delivery mechanisms are captured in Q4.2.

Example

Nil. All of the works must be implemented by private citizens. The project encourages practice change by private citizens (using delivery mechanisms documented in Q4.1) but does not implement works itself.

(c) Specify the works and on-ground actions that must be implemented by other organisations responsible for natural resource management to achieve the specific goal(s) of the project (Q2.1). Document which other organisations would need to act.

This question relates to works that other organisations responsible for natural resource management need to do. Examples could include engineering works on public land, or purchase and renovation of degraded land. The question does not relate to indirect actions, like enforcement of existing regulations, planning, extension, monitoring, payments to landholders, etc. even though some of these are intended to influence private citizens or other organisations. These delivery mechanisms are captured in Q4.3.

The relevant other organisation may include, for example, farmers' organisations, local government, state government agencies, national government departments, or environmental non-government organisations (NGOs).

Example

Nil. All of the works must be implemented by private citizens. The Department of Sustainability and Environment (DSE) will be encouraged to more strongly enforce its powers to prevent opportunistic cropping in this area, but DSE would not implement works itself.

The area is also fringed by local government roadsides containing significant vegetation. The need for action by local government will be assessed as part of the project.

(d) Briefly outline the causal links between these works and outcomes (relating to the goal) for the asset.

Explain how the works would improve or preserve the condition of the natural asset. The causal chain should be outlined.

Example

> Exclusion of grazing will directly improve the condition of native vegetation, as well as reducing recharge in those areas.
>
> Establishment of new native vegetation will provide increased natural habitat, as well as reducing recharge in those areas.
>
> Exclusion of cropping from 350 ha Gilgai country and cane-grass wetland will directly improve its condition.
>
> Increasing the area that is effectively under perennial vegetation to 8350 ha will lower groundwater tables sufficiently to reach the goal.

(e) Justification and information source(s)

Comment on the reason(s) for selecting the responses given in (a) and (b).

Indicate source(s) of information that were used. e.g., previous scientific studies (provide details); expert opinion by scientists (name); consensus of workshop participants (provide basic information about the workshop); estimates by officer completing this form based on a range of information; local knowledge from landholders or agency staff (name if possible).

Where does this information get followed up?

> Q2.3: Time lags until benefits, where we quantify the time lag until the above works would generate the desired benefits.
>
> Q2.4: Effectiveness of works, where we quantify the likely impacts of the above works on asset condition.
>
> Q2.5: Risk of technical failure, where we quantify the probability that the above works would not achieve the predicted changes.
>
> Q2.6: Spin-offs, where we identify any positive and negative spin-offs from the above works.
>
> Q3.3: Private adoption of works and actions, where we score the attractiveness of the required works to private landholders, to indicate likely adoption.
>
> Q4.1-4.3: Delivery mechanisms, where we identify the delivery mechanisms that are intended to bring the above works into place.

Example

> Establishment of 300 ha of new native vegetation will provide increased natural habitat will directly achieve the first goal.

Exclusion of grazing from 700 ha of native vegetation will achieve the second goal.

Modelling work of Beverly et al. (2009) indicates that 8350 ha of perennial vegetation in the right locations will achieve the third goal.

Beverly, C., Roberts, A., Hocking, M. and Pannell, D. (2009) Protecting environmental assets from dryland salinity in southern Australia. *Agriculture Ecosystems and Environment* (in preparation)

The results of Ridley et al. (2001) indicate that 7000 ha of land in a 3 lucerne: 3 wheat rotation can effectively be treated as 7000 ha under perennial vegetation.

Ridley, AM, Christy, B, Haines, PJ, Dunin, FX, Wilson, KF and the late A Ellington. (2001). Lucerne in crop rotations on the Riverine Plains; (1) the soil water balance. Australian Journal of Agricultural Research 52, 263-277.

2.3 Time lags until benefits

(a) If the works and actions specified in Q2.2 were fully implemented as a result of this project, what is the expected time lag (L) until the desired bio-physical outcomes would be achieved?

Record the value of *L* for calculation of the Benefit: Cost Ratio later:

L	Years

Select a single time lag in years that best represents the overall time lag to benefits for the project. It should represent the earliest time when a large proportion of the benefits will occur.

If the aim of intervention is to prevent future degradation, indicate the time frame when that damage would have occurred without new action.

If the aim is to improve asset condition from a current degraded state, indicate the time frame when the improved condition would be reached.

Benefits that occur earlier may have increased priority, provided they are feasible to achieve.

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report.

It is also reported directly in the Project Assessment Report.

FAQs

67, 76

Example

7 years

(b) Justification and information source(s)

Comment on the reason(s) for selecting the response given in (a).

Indicate source(s) of information that were used. e.g., previous scientific studies (provide details); expert opinion by scientists (name); consensus of workshop participants (provide basic information about the workshop); estimates by officer completing this form based on a range of information; local knowledge from landholders or agency staff (name if possible).

Example

Removal of stock will remove the overgrazing pressure. The benefits will be immediate once grazing is removed. If a significant flooding event occurs we would expect a different but complementary response (e.g. regeneration of River Red Gums). Whilst the timing of such an event is unknown, we should assume that this will occur within the next 10 years, certainly within the next 30 years.

Quality of information: Medium to high, based on expert ecological opinion and experience (Geoff Park, Gary Cheers, Lindsay Ezard)

Preventing cropping on sensitive areas will immediately reduce the habitat destruction threat. The time to realise a significant benefit will depend upon seasonal conditions. Areas where cropping practices are removed need to be allowed to regenerate naturally (where sufficient remnant vegetation remains to provide a source of propagules), the timing of benefits will be dependent upon seasons. In other areas, reintroduction of native vegetation (using a range of methods) will need to occur. Benefits will be realised if a significant flooding event occurs although the ability of the “grassland” and “grassy woodland” EVC’s to respond will be limited by their current condition. Where this is low the response time is likely to be greater than 10 years for limited rehabilitation.

Quality of information: Medium to high based on expert ecological opinion and experience (Geoff Park, Gary Cheers, Lindsay Ezard),

Modelling work by Beverly et al. (2009) suggests that the responsiveness of the groundwater system is in the order of 50 years. However, water tables are currently at least 4 m depth and so groundwater impacts are not threatening the asset immediately. Historic hydrological data from an adjoining site (Muddy Waterholes) shows immediate local impacts of lucerne on watertables (Mark Reid CLPR, 1996). Protecting existing remnants by stock removal and allowing recruitment, and planting of perennials now will provide asset protection in preparation for a potential return to several wet years.

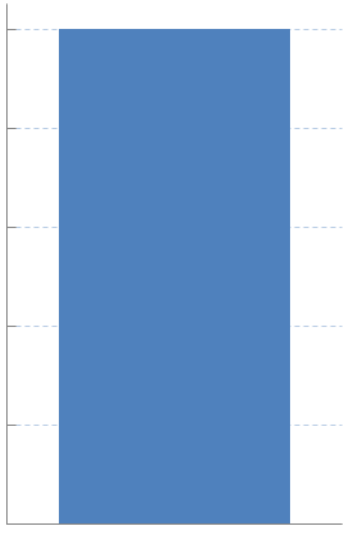
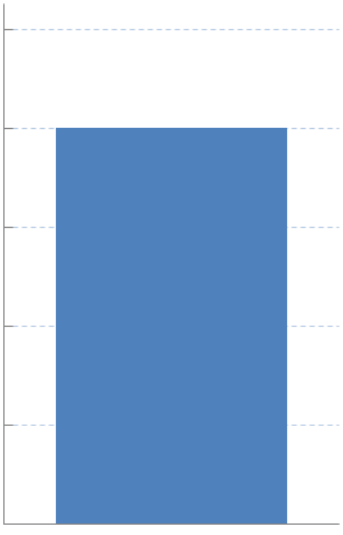
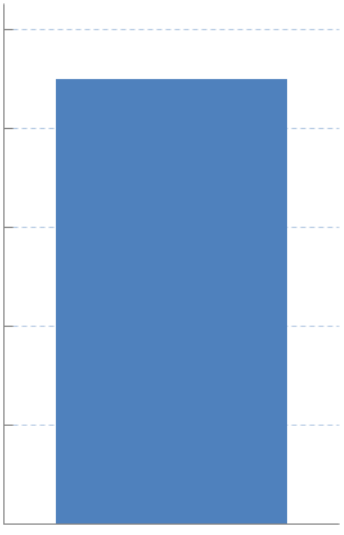
Quality of information is high – as good as available with current science.

2.4 Effectiveness of works

This question relates to the level of benefits expected to be generated by the specified works. It requires knowledge of the cause-and-effect relationships between actions and outcomes.

(a) What is the likely reduction in overall damage to the asset over the next 20 years resulting from the proposed works and actions (the works and actions that were outlined above in Q2.2)?

"Damage" means loss of overall asset value. Damage is measured relative to the benchmark asset condition defined in Q1.1(d)).

Benchmark asset condition	**Without the project**	**With the project**
The benchmark asset condition from Q1.1(d) is used as a reference point for the two questions to the right. Remind yourself of what the benchmark condition is before answering them.	All things considered, looking ahead 20 years, assuming this project is **not funded**, how much less valuable would the asset be than it would be if it was in benchmark condition.	All things considered, looking ahead 20 years, assuming this project **is funded**, how much less valuable would the asset be than it would be if it was in benchmark condition.
	20 %	10 %
V = 20	V = 16	V = 18
		

The intent here is to estimate the reduction in damage provided by this project, not by other projects. The reduction in damage is the difference between the second and third columns – 10% (= 20% − 10%) in the above example. Your response for "With the project" should factor in all the works of this project combined. There is no need to separate them out.

If there are other projects going on, allow for their benefits when you answer both the "Without the project" and "With the project" questions. When you subtract "With" from "Without", the effect of the other projects will be cancelled out, leaving only the effect of the current proposed project.

For very large assets, such as the entire Murray-Darling River system or the entire Great Barrier Reef, any one project is highly unlikely to affect the asset value greatly. Rather, we might see a change of say 1% in measures of water quality, unless the project budget is exceptionally large. For example, depending on what the benchmark asset condition is, the "Without the project" value might be 30 and the "With the project" value could be 29.

Note: There is a question later on (Q3.2(a)) about whether the project is trying to discourage people from changing away from their current practices to practices that are worse for the environment. If you answer yes to that question, you are asked (in Q3.4) about the attractiveness of those adverse practices to the people you hope to influence in this project. If you answer yes to the discourage-change question in Q3.2(a), it is important that your answers to Q2.4 are consistent with your answers to Q3.4. If the adverse practice is 'Highly attractive' to private individuals, the estimate of *W* should be based on an assumption that the adverse practices will be adopted by 80-100% of the relevant population. 'Slightly attractive' adverse practices should be expected to be adopted by say 20-30%. Adoption would be 5-10% for 'Neutral' practices; 0-5% for 'Slightly negative' practices and zero for 'Highly negative' practices. Thus, the more attractive the adverse practices are, the smaller *W* would be, because the practices would be more widely adopted.

This note relates to the component of *W* that is due to preventing the adoption of environmentally adverse practices. The project may also include actions aimed at encouraging the adoption of environmentally beneficial projects, which would be an additional component of *W*.

(b) Impact of works (W)

W represents the future reduction in damage to the asset that would result if the project was fully adopted and implemented compared to if it wasn't. It is measured as a proportion of the value of the asset in benchmark condition (as specified in Q1.1(d)). Intuitively, think of the value of the asset in benchmark condition … what proportion of that value would be protected or enhanced as a result of the project?

W 

W is measured as a proportion of the total value of the asset. This is done to allow easy comparability across projects. If more specific units were used (e.g. a reduction in concentration of a particular nutrient in a waterway), it would be more difficult to compare the effectiveness of works in projects for different assets.

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report.

Example

Reduction of damage from Very high to Medium.

W = 0.5

(c) Justification and information source(s)

Comment on the reason(s) for selecting the responses given in (a) and (b).

Indicate source(s) of information that were used. e.g., previous scientific studies (provide details); expert opinion by scientists (name); consensus of workshop participants (provide basic information about the workshop); estimates by officer completing this form based on a range of information; local knowledge from landholders or agency staff (name if possible).

Without the project

Provide justification and information sources for the response to the question about the future level of damage (loss of asset value relative to the benchmark) without this project. This relates to the middle column of 2.4(a).

Example

These comments make the case that, without further intervention, damage to the asset will reach 75% over the next 20 years.

Overgrazing

Lindsay Ezard (pers.comm.) and advice from local landowners.

Eighteen patches of vegetation were surveyed in the ecological assessment; with nine assessed as very high conservation significance and the remaining nine assessed as high conservation significance (DSE's habitat hectare methodology was used to determine this). Generally the quality of the vegetation across the project area is highly degraded (Cheers G, Cheers B (2008) Ecological Assessment – Coates Property Grays Bridge, Cheers Flora and Fauna Consultants, Havelock.).

Opportunistic cropping

Lindsay Ezard (pers.comm.) and advice from local landowners.

Salinisation

Understanding of groundwater conceptualisation – Phil Dyson, Peter Hekmeijer, Mark Hocking and Craig Beverly.

Local knowledge of salt indicator species affecting the York Plains wetlands – Lindsay Ezard.

Previous SIF3 analysis (Ridley A, Park G and Pannell D (2007) Community-identified priority assets for dryland salinity in the North Central Catchment Management Authority region: Recommendations August 2007, unpublished; Roberts, AM and Pannell, DJ (2009) Piloting a systematic framework (SIF3) for public investment in

regional natural resource management in dryland salinity in Australia Land Use Policy (in press).

Catchment modelling using the Catchment Analysis Tool to assess capture zones to protect the asset from dryland salinity (Beverly, C, Roberts, A, Hocking, M and Pannell D (2009) Protecting environmental assets from dryland salinity in southern Australia. Agriculture Ecosystems and Environment (in preparation))

EM38 data surveys (Advanced Soil mapping (2008) Electromagnetic surveys of York Plains capture zone)

Historic bore data from sites within the asset and beyond in the capture zone (from 1986 to present) – DPI Statewide Groundwater database

Streamflow gauging station data held in State-wide databases – including in stream salinity levels

With the project

Provide justification and information sources for the reduction in damage with this project in place. This relates to the third column of 2.4(a).

Example

These comments make the case that, with this project in place, damage to the asset over the next 20 years would be reduced to 25%.

CAT modelling indicates that conversion to 100% perenniality will maintain water levels below 2m across the entire capture zone (with a “non climate change scenario”)

Strong anecdotal evidence that 100% stock exclusion will lead to excellent ecological responses. Results from Mandatory Monitoring site on edge of capture zone (Marnoo East) shows recovery potential of remnant vegetation in same biome.

Permanent establishment of perennial vegetation of 8,400 ha is based on CAT modelling (Beverly et al. 2009). This is the most comprehensive, integrated analyses done, based on current scientific understanding. An earlier version of the paper was published at the International Salinity Conference (Adelaide 2008). The groundwater systems in the catchment have now been reconceptualised with Phil Dyson and a paper is currently in preparation for the international journal Agriculture Ecosystems and Environment.

Consistency check 1

Is the estimated reduction in damage (Q2.4) consistent with the specific goal (Q2.1)? In other words, is there a high probability that the actions (Q2.2) would fully achieve the goal?

☐ Yes: go to Question 2.5

☐ No: You must either: (i) make the goal less ambitious (Q2.1), or (ii) increase the intensity of actions (Q2.2) and then re-do Q2.4.

2.5 Risk of technical failure

(a) What is the probability that the benefits generated by the specified works and actions would fall short of requirements? (i.e. Assuming that the works and actions specified in Q2.2 were fully implemented, what is the risk that the actual benefits would be significantly less than the benefits predicted in Q2.4?)

☐ 0-5% Very low risk of project failure due to poor technical feasibility. (*F* = 0.97)

☐ 6-10% (*F* = 0.92)

☐ 11-15% (*F* = 0.87)

☐ 16-20% (*F* = 0.82)

☐ 21-100% High risk of long-term project failure due to poor technical feasibility. (*F* = 0.4)

Notice that the response categories offered are not evenly spaced. The reason is that, if you have followed instructions up to this point, there should not be a very high risk of technical failure (as defined in the question). The impact of works specified in Q2.4 should be a realistic indication of what would happen if the works were implemented. If you select the fifth category (21-100% High risk of long-term project failure), you should really go back and modify your response to Q2.4 to a more realistic level and then revise your response to Q2.5.

(b) Technical feasibility (F)

The PAF records the value of *F* from your earlier responses for use in calculation of the Benefit: Cost Ratio later:

F [ ]

"Poor technical feasibility" means that, even if the works specified in Q2.2 are fully implemented, the impact of works will be significantly less than indicated in Q2.4.

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report.

It is also reported directly in the Project Assessment Report as a risk factor.#

Example

11-15%

F = 0.88

2.6 Positive and negative spin-offs from the project

The information provided should be about spin-offs to people other than those who will be implementing the works and actions (including spin-offs to the environment). A negative impact on the landholder who is being asked to implement the works is not a spin-off. It would instead need to be considered in Q3.3 when you weigh up the likely adoption of the works.

(a) Note in words any positive spin-offs that the project has for other public assets or for people other than those implementing the works and actions.

For example, a project that primarily focused on natural habitat my also provide downstream benefits in terms of water quality or salinity. Be as specific and as quantitative about these impacts as possible.

Where does this information get followed up?

It is reported in the Project Assessment Report.

Example

The management changes specified for this project will reduce movement of surface water off around 5,000 ha of land. This will reduce sediment, nitrogen and phosphorus loads in the waterway. It is expected that the main effect will be on nitrogen, although the effect will be very minor in the context of all sources affecting this waterway.

(b) Note in words any negative spin-offs that the project has for other public assets or for people other than those implementing the works and actions.

For example, a project that involves planting of native vegetation in place of annual crops or pastures may result in less surface water flowing into waterways, and therefore less available to downstream water users. Be as specific and as quantitative about these impacts as possible.

Where does this information get followed up?

It is reported in the Project Assessment Report.

Example

> Minor risks: Potential weed impacts associated with cessation of grazing. Potentially increased fire impacts due to increased fuel loads.

2.7 Knowledge gaps and quality of information for Section 2

(a) Note key knowledge gaps in Part 2 that may require additional research, analysis or investigation (e.g. about technical feasibility, cause and effect relationships, links between actions and outcomes).

This relates to knowledge gaps on the part of the environmental management body, not the land managers or other stakeholders.

Where does this information get followed up?

> It is reported in the Project Assessment Report.

Example

> Groundwater conceptualisation is not perfect, as is the case anywhere in Australia. The time lag times for groundwater responses are based on best available science and are unlikely to be improved without a large R&D program involving bore drilling.

(b) Score the quality of information used to underpin your responses to Part 2.

Very poor Poor Medium Good Very good

1☐ ——————— 2☐ ——————— 3☐ ——————— 4☐ ——————— 5☐

1 = very poor information. Little or no information available.
2 = poor information. e.g. Some anecdotal evidence, but no local expert available.
3 = medium information. e.g. Judgement of a local expert based on limited evidence
4 = good information. e.g. Judgement of local expert based on some relevant evidence
5 = very good information. e.g. Highly relevant published scientific evidence.

Where does this information get followed up?

> It is reported in the Project Assessment Report.

Section 3: Practice change

This section addresses a range of issues related to the behaviour of private citizens. Most importantly, it asks about the adoption of the required works and actions by the relevant managers. The section contributes to assessment of likely project effectiveness and project risks.

3.1 Do some of the required works or actions (Q2.2) have to be implemented by private landholders or other private citizens?

☐ Yes: go to Question 3.2

☐ No: go to Question 3.5

Many, but not all, projects require private landholders or other private citizens to change their practices in some way. For these, answer yes. Some are implemented solely by environmental management bodies, independent from private citizens. For these, answer no.

3.2 Is the aim of project to encourage beneficial change or to discourage adverse change in management?

☐ The project aims to encourage changes away from current practice (in order to provide benefits for natural assets): complete Question 3.3.

Examples

The project aims to result in a change of land-use from wheat production to perennial pastures.

The project aims to result in a change of crop management from traditional cultivation methods to minimum tillage.

The project aims to result in the fencing of riparian areas that are currently unfenced.

☐ The project aims to discourage changes away from current practice (in order to avoid greater damage to natural assets): complete Question 3.4.

These sorts of projects are ones for which command-and-control regulation is typically used as the main policy mechanism. Clearing of native vegetation is a typical example in Australia.

Note: If you answer yes to this question, you are asked (in Q3.4) about the attractiveness of those adverse practices to the people you hope to influence in this project. It is important that your answers to Q2.4 are consistent with your answers to Q3.4. If the adverse practice is 'Highly attractive' to private individuals, the estimate of *W* should be based on an assumption that the adverse practices will be adopted by 80-100% of the relevant population. 'Slightly attractive' adverse practices should be expected to be adopted by say 20-30%. Adoption would be 5-10% for 'Neutral' practices; 0-5% for 'Slightly negative' practices and zero for 'Highly negative' practices. Thus, the less attractive the adverse practices are, the smaller *W* would be, because the practices would be less widely adopted.

This note relates to the component of *W* that is due to preventing the adoption of environmentally adverse practices. The project may also include actions aimed at encouraging the adoption of environmentally beneficial projects, which would be an additional component of *W*.

Examples

The landholders in a region are in the process of establishing plantations on land that is currently annual pasture. The project aims to prevent the conversion to plantations in certain locations, to preserve fresh water yield into a river.

A new crop species has become available that would grow well on soils that are not currently cropped and which contain highly valued native pastures. The crop is not currently adopted but appears likely to be adopted in future, resulting in the loss of the native pastures. The project aims to prevent adoption of the crop on those soils.

Landholders are clearing native vegetation for agriculture. The project aims to prevent this clearling.

Most projects aim to encourage positive changes in behaviour or in land/water management, in order to provide benefits for natural assets. For these projects, select the first response.

For some projects, the aim is to prevent changes that would have negative public consequences. These interventions are often of the nature of planning constraints, or regulatory constraints. For these cases, select the second response.

Some projects might include elements of both types. For example, a state agency might conduct extension to encourage positive changes, and introduce regulations to prevent negative changes. If so, you need to complete both Q3.3 and Q3.4 (they will only be displayed if you tick the corresponding box in Q3.2)..

3.3 Private adoption of works and actions

(a) Consider the works and actions that have been specified for private land and water managers (and other private citizens) in Q2.2. In the absence of this project, how attractive is full adoption of these works to the relevant private citizens?

☐ Highly attractive. Even without this project, the works/actions would probably be adopted at the required scale over the coming decade.

☐ Slightly attractive. Without this project, the works/actions would probably be adopted to some extent, but at less than the required scale, and reaching peak adoption would take more than a decade.

☐ Neutral. There is currently little or no adoption of the works/actions, and it is unlikely that they would proceed to higher levels of adoption without a policy intervention based on payments or regulation. However, it is expected that small-modest, temporary payments or light regulation would be sufficient to prompt long-term adoption.

☐ Slightly negative. The works/actions would not be adopted without moderate ongoing payments or regulation.

☐ Highly negative. The works/actions would not be adopted without large ongoing payments or strongly-enforced regulation.

Note that the question refers to full adoption, not partial adoption. “Full adoption” means that all of the works and actions specified in Q2.2 would be adopted. In general, the larger the

scale of adoption required, the less likely it is to be attractive to potential adopters. Changes that may be attractive if adopted at a small scale can often be highly unattractive if they have to be adopted at a large scale.

The attractiveness of a new practice is influenced by many factors, including: its costs, its financial benefits, its riskiness, its complexity, its compatibility with existing practices and systems, social pressures for or against the practice, and the attractiveness of the existing practice that the new practice would replace. The strength of community networks, community knowledge/awareness, community attitudes, and so on also play a role.

It is not expected that you should necessarily be able to respond to this question well without drawing in additional information. Consider a range of evidence and opinion about landholder adoption of the desired practices, including: their current levels of adoption; the extent to which that adoption has already been encouraged by extension or other means; whether those past efforts to promote adoption were successful; and the likely economic costs and returns from the practice. To help form judgements about these issues, you might have discussions with the relevant landholders, run workshops witht them, talk to their business consultants or extension agents, do economic analysis, conduct a survey, or look at mapped data on current adoption of the practices (e.g. reflected in uptake of incentive payments/grants). You might also draw on the wide range of existing papers, reports, tools and resources that relate to the adoption question. For example, see www.ruralpracticechange.org or refer to the following paper as a lead into the substantial research literature in this area.

> Pannell, D.J., Marshall, G.R., Barr, N., Curtis, A., Vanclay, F. and Wilkinson, R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture* 46(11): 1407-1424.

Be realistic about adoption levels that are likely. For example, history shows that even in areas with strong social networks and well-informed landholders, voluntary adoption of conservation practices is often well below the levels required to achieve resource conservation goals.

For some projects, the people whose behaviour would need to change are not land or water managers, but third parties. For example, it may be townspeople collecting firewood from a valuable area of native habitat. In this case, answer Q3.3. for these third parties, rather than for the land manager. The principle is that the question relates to the people whose behaviour or management needs to change to protect or enhance the asset.

The response to this question is used for two purposes: (i) as an input to the selection of an appropriate class of policy mechanism (in Section 4), and (ii) to estimate *A*, the likely proportion of adoption obtained, relative to the desired level. The conversion to *A* depends on whether the project is dealing with a very favourable or less favourable adoption situation (Q3.3(b)).

FAQs

> 301, 302, 303, 304, 305, 306

(b) How favourable are the circumstances of this project for adoption of the desired works/actions by the relevant private citizens?

☐ Very favourable adoption circumstances. For example, small target audience for adoption, with excellent links to the organisation running the project.

☐ Less favourable adoption circumstances. For example, a larger and more diverse target audience for adoption, with varying strengths of linkage to the organisation running the project.

(c) Click this box if you wish to enter a custom value for A.

By default, the PAF records the value of *A* from your earlier responses (see Table 4) for use in calculation of the Benefit: Cost Ratio later. However, you can over-ride the standard method for estimating *A* and provide your own value if you have grounds for believing that the standard value is inappropriate for this project. If you have ticked this box, click in the *A* box to enter your preferred value.

A [ ]

Table 4. Values of *A* based on responses to Q3.3(a) and Q3.3(b). Rationales are provided.

Average score	**Very favourable adoption circumstances**	**Less favourable adoption circumstances**
Highly attractive	1.0: Given the very favourable circumstances, the project interventions are likely to be fully successful at prompting full adoption.	0.9: The works are highly attractive, so adoption will be high, but given the many challenges involved, full adoption is still not assured.
Slightly attractive	1.0: Given the very favourable circumstances, the project interventions are likely to be fully successful at prompting full adoption.	0.8: Full adoption reasonably likely.
Neutral	1.0: Given the very favourable circumstances, the project interventions are likely to be fully successful at prompting full adoption.	0.7: Potential adopters consider that positive and negative aspects of the works are approximately in balance. With an intensive intervention, there should be a better than 50% probability of adequate adoption.
Slightly negative	0.8: The project would be highly successful at prompting adoption, but there is a modest risk that it will not be fully successful.	0.6: Moderate risk of poor adoption even with the project in place.
Highly negative	0.6: Given that the works/actions are highly unattractive to the target audience, there is a moderate risk of poor adoption, even with the project in place.	0.4: The works are highly unattractive to potential adopters, and even with substantial and costly policy interventions, adoption well below the target level is the most likely outcome.
Not relevant	1.0: No private adoption required.	1.0: No private adoption required.

The *A* values given in Table 4 are judgements based on observation of adoption levels in past projects, and extensive review of the research literature on adoption of innovations

(Pannell et al., 2006). They represent the proportion of target adoption that is expected to occur as a result of this project. ("Target" adoption means full adoption of the works and on-ground action specified in Q2.2.) For example, under less favourable adoption circumstances, with slightly attractive works/actions, it is estimated that, even with the project in place, only 80% of the target adoption level will be achieved.

Note that the adoption proportions are not evenly spaced. The numbers tend to be nearer to 1 than to zero, especially in the "favourable adoption" column. This reflects that the project aims to encourage adoption of the works, and is likely to succeed (to a greater or lesser extent, depending on the circumstances). If projects always succeeded in achieving full adoption, all the numbers in the table would be 1.0. Realistically, of course, projects often fall short of this ideal, and the numbers in the table reflect this.

This bunching of *A* values towards 1 means that the relationship between response categories and *A* is non-linear. Going from "Highly attractive" to "Slightly attractive", the reduction in likely adoption is zero (or relatively low in the right column), since "Slightly attractive" is judged to be sufficient to lead to full adoption (or high adoption in the right column). Going from "Slightly negative" to "Highly negative", adoption is assumed to drop off more rapidly, since practices with highly negative adoption characteristics are likely to be much harder to get adopted than practices with slightly negative characteristics.

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report

It is also reported in the Project Assessment Report as a risk factor.

(d) Justification and information source(s)

Spell out the logic and evidence behind your response. In particular comment on current levels of adoption of the required works and the extent of additional change being sought by the project (e.g. they are currently adopted on 10% of the required scale). Comment on whether the works are on a positive adoption trajectory (e.g. they are a new technology whose adoption is still growing) or whether their adoption is currently relatively stable or even falling (e.g. they are an existing technology that has been promoted to farmers before and has reached an equilibrium level of adoption). Large changes in adoption are much more likely for the former category (works on a positive adoption trajectory). It is *much* more difficult to expand adoption of works with which people already know about and have decided not to adopt.

Indicate source(s) of information that were used. e.g., previous scientific studies (provide details); expert opinion by scientists (name); consensus of workshop participants (provide basic information about the workshop); estimates by officer completing this form based on a range of information; local knowledge from landholders or agency staff (name if possible).

Example

The required actions all require income sacrifices by landholders, so they are either slightly or highly unattractive. Given that some lucerne is grown in the area, and lucerne constitutes the largest area of land-use change, the rating chosen is slightly rather than highly unattractive.

Sources: Paper written by DPI senior case manager Lindsay Ezard. Extensive local knowledge and experience. Revegetation costs emerging from Carbon market programs in this landscape.

Consistency check 2

A common mistake is to over-estimate the adoption that would really occur. Are the responses to Q3.3 consistent with observed adoption behaviour for these practices or similar ones in the region(s) of this project?

☐ Yes: go to Question 3.4

☐ No: modify the responses to Q3.3.

3.4 Preventing adoption of adverse practices

(a) Consider the practices whose adoption you wish to prevent. How attractive are these practices to private land and water managers?

☐ Highly attractive. It will be difficult and/or expensive to prevent their adoption. (B = 0.4)

☐ Slightly attractive. It will be moderately difficult and/or expensive to prevent their adoption. (B = 0.7)

☐ Neutral. It will be easy to prevent their adoption. (B = 0.9)

☐ Slightly negative. Adoption is unlikely, irrespective of this project. (B = 0.95)

☐ Highly negative. Adoption is highly unlikely, irrespective of this project. (B = 1.0)

The response to this question is used as an input to the selection of an appropriate class of policy mechanism (in Section 4). The response is also converted into a probability of project success (B) as follows.

Score	Assumed probability of project success (*B*)	Rationale
Highly attractive	0.4	The works are highly attractive, so it will be difficult and expensive to prevent adoption. Even with the project in place, significant adoption is still the most likely outcome.
Slightly positive	0.7	Intermediate
Neutral	0.9	Potential adoptions consider that positive and negative aspects of the works are approximately in balance, so it should be possible to prevent most adoption.
Slightly negative	0.95	The works are unattractive so there is little risk of them being adopted.
Highly negative	1.0	The works are highly unattractive so there is no risk of them being adopted.
Question not relevant	1.0	Project does not focus on preventing adoption of adverse practices.

The values of *B* represent the probability that the project will be successful in *preventing* adoption of the adverse practices. The probability is lower for cases where the practices are more attractive to landholders. That is, we recognise the risk that the project may not be successful, because landholders may adopt these adverse practices despite the project's efforts. Nevertheless, the values of *B* tend to lean towards 1 rather than zero, indicating that success is more likely than failure, except in the case where the adverse practices are highly attractive to landholders.

Note that the answer to Q2.4 should be consistent with the answer to this question. If the adverse practice is 'Highly attractive' to private individuals, the estimate of *W* would be based on an assumption that the adverse practices will be adopted by 80-100% of the relevant population. 'Slightly attractive' adverse practices should be expected to be adopted by say 20-30%. Adoption would be 5-10% for 'Neutral' practices; 0-5% for 'Slightly negative' practices and zero for 'Highly negative' practices. Thus, although the proportional effectiveness of the project would be greater for less attractive practices, the problem being avoided (indicated by *W*) would be less. For Highly negative adverse practices, the component of *W* due to adoption of adverse practices should be zero. (*W* may still be greater than zero due to the project encouraging adoption of beneficial practices, as reflected in *A*.)

(b) From Q3.4(a), the adverse adoption multiplier (B), for calculation of the Benefit: Cost Ratio is as follows:

B	

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report

It is also reported in the Project Assessment Report as a risk factor.

(c) Justification and information source(s)

Comment on the reason(s) for selecting the response given in (a).

Indicate source(s) of information that were used. e.g., previous scientific studies (provide details); expert opinion by scientists (name); consensus of workshop participants (provide basic information about the workshop); estimates by officer completing this form based on a range of information; local knowledge from landholders or agency staff (name if possible).

Example

This project is attempting to prevent establishment of plantations in an area where fresh surface water run-off is important to downstream water users. Plantations in this area are judged to be only slightly more profitable than existing grazing systems, hence the selection of “Slightly positive” as the score for this question.

Sources: Locally based agricultural economist. Observations of the rate of uptake of plantations locally.

3.5 Approvals

What legal approvals would be required to undertake the works?

This question could relate to works to be undertaken by public agencies, NGOs, local governments, private landholders or private water managers.

Where does this information get followed up?

It is considered in the estimation of socio-political risk for the project (Q4.4). The need for approvals may introduce a risk factor that reduces the probability of project success.

Example

Planning approval required for certain works, e.g. potential for impact on sites of high indigenous cultural significance.

State government approval required for installation of drains for salinity.

3.6 Knowledge gaps and quality of information for Section 3

(a) Note key knowledge gaps in Section 3 that may require additional research, analysis or investigation (e.g. about practice change or socio-economic risks).

This relates to knowledge gaps on the part of the environmental management body, not the land managers or other stakeholders.

Where does this information get followed up?

It is reported in the Project Assessment Report.

Example

Main gap is knowledge of the economic costs and benefits of the works and actions. Responses are based on judgement and on observations of local practices and trends.

(b) Score the quality of information used to underpin your responses to Section 3.

Very poor Poor Medium Good Very good

1☐ ———— 2☐ ———— 3☐ ———— 4☐ ———— 5☐

1 = very poor information. Little or no information available.
2 = poor information. e.g. Some anecdotal evidence, but no local expert available.
3 = medium information. e.g. Judgement of a local expert based on limited evidence
4 = good information. e.g. Judgement of local expert based on some relevant evidence
5 = very good information. e.g. Highly relevant published scientific evidence.

Where does this information get followed up?

It is reported in the Project Assessment Report.

3.7 Response to knowledge gaps

Considering the knowledge gaps identified in Sections 1 (Q1.5), 2 (Q2.7) and 3 (Q3.6) indicate whether:

(i) one or more of the gaps should be addressed before the project proceeds;

(ii) one or more of the gaps should be addressed during the project; or

(iii) the project can safely proceed without filling any of the gaps.

For which threats is knowledge of the degree and urgency of threat not sufficient to properly assess the project? Which specific pieces of information should be priorities for further research?

Consider whether the information gaps and quality of information for Section 1 are such that the need is for an investigation project, rather than a project of works and actions.

Where does this information get followed up?

If a knowledge gap needs to be filled before the project proceeds, this may be handled by having a feasibility assessment phase at the start of the project, or it may lead to a separate investigation project to be completed before any implementation project.

If research, investigation or analysis is needed to fill a knowledge gap within this project, this would be documented in Q4.2(b).

Example

None of the knowledge gaps are severe enough to hold up commencement of the project.

Better information about the attractiveness of changed practices can be obtained in early stages of the projects when agreements and payment levels are negotiated with landholders.

The project needs to engage technical specialists to provide detailed advice on hydrogeological specifications and ecological responses of wetland/riparian/terrestrial asset components.

Section 4: Delivery mechanisms, risks and costs

Questions 4.1, 4.2 and 4.3 are where you specify everything <u>your</u> organisation needs to do to achieve the project goal. They are about what your organisation will do to bring about the actions in Q2.2. Some of those actions might be undertaken directly by your organisation, while for others the role of your organisation may be to encourage others to undertake actions.

If the project does not require works or actions to be implemented by private citizens, go to Q4.2.

4.1 Delivery mechanisms – private landholders and other private citizens

(a) Do you plan to use payment mechanisms to encourage practice change by private land/water managers? (e.g. stewardship payments, incentive payments, conservation tenders.) If yes, estimate the level of payments required to achieve full adoption of the required works (Q2.2) within 10 years (i.e. payments sufficient to prompt very high adoption).

Where does this information get followed up?

It will guide the design of specific payment mechanisms in Q4.1(e).

It will be reflected in the project budget, Q4.5.

Example

Establishment of new native vegetation: $2000/ha x 300 ha

Protection of existing vegetation: $150/ha/year x 700 ha x 5 years

Lucerne: $100/ha/year x 3500 ha x 5 years

Weed and pest control: $100,000 in total

Consistency check 3

If you plan to use payment mechanisms to encourage practice change, are the levels of payments specified in Q4.1(a) consistent with the attractiveness of the new practices as specified in Q3.3?

☐ Yes: go to Question 4.1(b)

☐ No: You must change the levels of payments.

Don't assume that provision of subsidised inputs or standard-level incentive payments will lead to the required adoption. Unless the required changes are very small, your estimated payments will probably need to be close to the full net costs to landholders, including losses from moving away from a more profitable land use (if relevant). If the landholders are not commercially oriented (e.g. lifestylers), ensure that your estimated payments will be sufficient to overcome typical barriers to adoption by these landholders, such as lack of time, lack of skills, and concerns about the aesthetics of their properties.

The level of payments should be consistent with this table.

Response to Q3.3	**Comment**
Very attractive	Payments not required

Slightly attractive	Payment possibly not required, or at most should be small and temporary
Neutral	Payments should be small and temporary
Slightly negative	Payments should be larger and longer-term
Highly negative	Likely that payment-based mechanisms will be too expensive to be good value for money.

(b) Do you plan to use covenants? If yes, provide details of the terms of the covenants, and the penalties for non-compliance. What are the private costs (including income sacrifices) that will need to be borne by landholders as a result of establishing covenants, above and beyond any payments to be provided by this project? What will it cost to establish the covenants?

Where does this information get followed up?

Costs to the project of establishing covenants will be reflected in the project budget in Q4.5 (costs).

Terms and penalties should be reported in Q4.1(e) (details of delivery mechanisms).

The question about private income sacrifice may prompt you to reconsider Q3.3 (adoption).

Example

Permanent covenants will be established across 5000 ha on 10 farms. Terms: stock to be permanently excluded, vegetation maintained in good condition. Penalty for non-compliance: recovery of costs. All of this land is already native vegetation that is fenced off from stock, so there is no income sacrifice involved. Estimated legal costs: $50,000.

(c) Do you plan to establish voluntary agreements? If yes, what is the basis for expecting that they will be complied with? Who will assess compliance, how and when? What are the planned durations of agreements? What will it cost to establish the agreements?

Where does this information get followed up?

Costs to the project of establishing agreements will be reflected in the project budget in Q4.5 (costs).

Other details reported in Q4.1(e) (details of delivery mechanisms).

Example

> Yes. Compliance is expected as the project involves a small number of farmers in a tight-knit community. Compliance will be assessed by officers of the North Central CMA, by visits to all participating farms in years 1, 3 and 5 of the project. Planned duration: 5 years in the first instance. Cost of establishment: $50,000 in total (legal costs).

(d) Do you plan to rely on extension as the main delivery mechanism for one or more threats?

☐ Yes: do Consistency check 4

☐ No: go to Question 4.1(e)

Consistency check 4

Did you answer "Slightly attractive" or "Highly attractive" in Q3.3?

☐ Yes: go to Question 4.1(e)

☐ No: you should reconsider your main reliance on extension for this threat. Adoption is unlikely to be sufficient.

Extension alone is unlikely to generate enduring adoption of new practices unless those practices offer worthwhile benefits to the potential adopters.

(e) Detail the delivery mechanisms to be used in this project to encourage private citizens to undertake the works and on-ground actions specified in Q2.2(a).

The relevant private citizens were documented in Q2.2(a), together with the works and actions they would need to undertake. For this question, describe the actions that will be taken in the project to influence those citizens, not the actions required of private citizens. In other words, in Q2.2(a) we documented what works have to happen and who has to do them, while this question is asking how the project will make those works come about.

Provide details such as:

- Which policy mechanisms will be used (e.g. extension, covenants, codes of practice, research, incentive payments, economic instruments, regulation, technology development, …)
- Design of any incentive mechanisms
- Expected payment per hectare
- The area over which payments will be made
- Numbers of extension staff
- Areas under covenants or voluntary agreements
- Monitoring and enforcement of actions

Some of the required details were collected in Q4.1(a), Q4.1(b) and Q4.1(c).

Where does this information get followed up?

Costs to the project from implementing these delivery mechanisms will be reflected in the project budget in Q4.5 (costs).

The delivery mechanisms are key elements of the methods of the project and would be captured in funding proposals or project implementation plans.

Example

Habitat destruction due to over grazing

Management agreements with relevant landholders, involving payment for opportunity costs (lost profits): 700 ha of existing vegetation with grazing excluded and 300 ha of newly established vegetation.

Provide funding for targeted weed and pest control.

Habitat destruction due to cropping

Management agreements with relevant landholders, involving payment for opportunity costs (lost profits): cropping excluded from 350 ha of land.

Previous experience suggests that it is not possible to invoke Native Vegetation Retention (NVR) controls on these areas due to a lack of enforcement from Local Government and DSE as the responsible authorities.

A key action for the project is to negotiate payment levels with the landholders involved and budget the costs based on lost opportunity costs of production.

Salinisation due to altered hydrological processes

Management agreements with relevant landholders, involving the maintenance of perennial pasture on 3,500 ha of lucerne at any one time. Lucerne will be part of an ongoing management rotation. Needs to be negotiated with each of the 15 Landholders in the York Plains capture zone.

Project-wide

Extension officer to provide information, negotiate agreements, inspect compliance, monitor results: 0.75 FTE per year for 5 years

(f) Do you plan to use a regulatory approach that requires private citizens to make changes that they would otherwise not be willing to make?

☐ Yes: you will be asked to estimate the compliance costs to private citizens in Q4.5(d) (below)

☐ No

4.2 Delivery mechanisms – works, investigation and management

(a) Describe in detail all works and actions (from Q2.2) that will be fully implemented by the project itself, rather than by private citizens or other organisations.

This is intended to capture on-ground actions such as engineering works implemented by the project proponents themselves, and management actions on land that they manage directly.

Where does this information get followed up?

> Costs to the project from implementing these delivery mechanisms will be reflected in the project budget in Q4.5 (costs).
>
> The delivery mechanisms are key elements of the methods of the project and would be captured in funding proposals or project implementation plans.

Example

> Install 4 pumps to lower saline groundwater underneath one of the wetlands.
>
> or
>
> Nil. The works in this project will all be implemented by private citizens.

(b) Describe investigations (data collection, research, analysis) that will be included within the project.

Check Q1.5, Q2.7 and Q3.6 to see whether there any knowledge gaps that should be filled during the project. If so, describe how they will be filled.

Where does this information get followed up?

> Costs to the project from undertaking these investigations will be reflected in the project budget in Q4.5 (costs).
>
> The delivery mechanisms are key elements of the methods of the project and would be captured in funding proposals or project implementation plans.

Example

> Install four additional bores to monitor groundwater levels.
>
> Engage technical specialists (hydrogeology, ecology) to advise on the design and location of specific works.

(c) Describe management arrangements for the project.

Who will be responsible for the implementation of the project? Who will provide oversight?

Where does this information get followed up?

Costs to the project from implementing these management arrangements will be reflected in the project budget in Q4.5 (costs).

Management arrangements would be captured in funding proposals or project implementation plans.

Example

The project will be managed by the appointed extension officer, overseen by North Central CMA managers.

4.3 Delivery mechanisms – other organisations

(a) Describe any measures that need to be undertaken by other organisations responsible for natural resource management.

This question is about the use by other organisations of policy mechanisms such as education, training, regulation, research, etc. That is, it is about mechanisms that achieve their outcomes indirectly through influencing decision makers and managers, rather than by directly implementing works.

The following question asks what delivery mechanisms the project will use to encourage other organisations to implement the delivery mechanisms specified here. For example, the project may use delivery mechanisms such as meetings and publications (specified in Q4.3(b)) to encourage a government agency to enforce an existing regulation (better enforcement would be specified here in Q4.3(a)) in order to encourage landholders to take actions to reduce erosion (these actions would be specified in Q2.2(a)).

Where does this information get followed up?

Q4.3(b): where we document the delivery mechanisms to be used in this project to encourage the other organisations to cooperate.

FAQs

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Example

Stronger enforcement of existing native vegetation legislation by the Department of Sustainability and Environment to prevent opportunistic cropping.

(b) Detail all delivery mechanisms to be used in this project to encourage other organisations to undertake all measures required for this project to achieve its goal(s).

Include mechanisms to encourage (i) works and on-ground actions (e.g. engineering works), and (ii) indirect actions (e.g. enforcement of regulations, planning changes).

Provide details such as:

- Communication methods to be used
- Committees or steering groups to be formed
- Individuals or committees to be targeted for communications
- Advice or training to be provided
- Agreements to be established
- Monitoring of actions by other organisations
- Staff to be appointed to deliver these activities

This question (4.3(b)) is about the actions of the environmental management body responsible for this project, not actions required of other organisations, which were specified in Q2.2(c) and Q4.3(a). What actions will your organisation take to influence the other organisations?

Where does this information get followed up?

Costs to the project from implementing these delivery mechanisms will be reflected in the project budget in Q4.5 (costs).

The delivery mechanisms are key elements of the methods of the project and would be captured in funding proposals or project implementation plans.

They will be reflected in Q4.4 (socio-political risks), where we quantify the risk that the changes required of other organisations will not be made. The more effective you judge that the delivery mechanisms will be, the lower the socio-political risks.

FAQs

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Example

Conduct meetings with the Department of Sustainability and Environment to request stronger enforcement of existing native vegetation legislation to prevent opportunistic cropping.

4.4 Socio-political risks

(a) Estimate the risk that the project will fail to achieve its goal(s) (Q2.1) due to one or more of the following factors.

(i) Non-cooperation by other organisations responsible for natural resource management.

This encompasses considerations such as direct costs to the other organisation, the capacity of the other organisation, the priorities of the other organisation, and the likely effectiveness of delivery mechanisms used in this project to try to influence the other organisation.

Check Q2.2(c) to see works and on-ground actions by other organisations that are essential to achieving the goal(s) of this project. Check Q4.3(a) to see policy mechanisms that other organisations would need to adopt. Check Q4.3(b) to see the delivery mechanisms that will

be used in this project to encourage the other organisations to adopt the required works and policy mechanisms.

(ii) Social, administrative or political constraints.

Consider whether the project will be supported or obstructed by social, administrative or political factors, including support or opposition by local community groups and networks, likely resistance to the project at the political level, bureaucratic approvals that would be needed, support or opposition by local government, etc. What is the probability that the project will fail to reach its goal due to one or more of these factors? If legal approvals are required (Q3.5), what is the probability that they will not be forthcoming?

		Value of *P*
☐	0-5% Very low risk of project failure for either of the specified reasons.	0.97
☐	6-25%	0.85
☐	26-50%	0.62
☐	51-75%	0.37
☐	76-100% Very high risk of long-term project failure for either of the specified reasons.	0.12
☐	Enter custom value for probability failure.	1 – custom value

This question is important for assessing the likely benefits of the project and the risks it faces.

Where does this information get followed up?

The value of *P* is used in calculating the Benefit: Cost Ratio for the project.

It is also reported in the Project Assessment Report as a risk factor.

FAQs

78, 302, 304

(bFrom Q4.4(a), the socio-political risk multiplier (P), for calculation of the Benefit: Cost Ratio is as follows:

P [ ]

(c) Justification and information source(s)

Comment on the reason(s) for selecting the response given in (a). How will the delivery mechanisms specified in Q4.1-Q4.3 reduce the socio-political risks?

Indicate source(s) of information that were used. e.g., previous scientific studies (provide details); expert opinion by scientists (name); consensus of workshop participants (provide basic information about the workshop); estimates by officer completing this form based on a range of information; local knowledge from landholders or agency staff (name if possible).

Example

> The changes proposed are considered to be uncontroversial and likely to be acceptable to the local community. The project would be attractive to government agencies. The requirements for other organisations to take actions are minor and project success does not depend on them.
>
> Sources: local extension staff.

Consistency check 5

Considering the answer to Q4.4(a), is there a sufficiently high probability of achieving the specific goal (Q2.1)? (at least 85%)

☐ Yes: go to Question 4.5

☐ No: Modify the goal, such that there is a lower probability of failing to achieve the goal for one of the specified reasons.

You cannot legitimately put forward a goal that is known to have a high probability of failure. To do so distorts the decision making process to favour projects with exaggerated goals.

A less demanding goal may increase feasibility and/or reduce costs, but of course a less demanding goal is in itself less attractive than a more demanding goal (assuming both can be achieved).

4.5 Costs

(a) What is the duration of the proposed project, in years?

(b) Provide costs for the project, broken down by cost item.

This question relates to actions required in the current phase of project funding (e.g. 3 to 5 years). The next question relates to costs after this time frame.

Item description	**Estimated costs** Total for current phase of project (e.g. 3-5 years)			
	Cash (being sought for this project) ($)	**Cash** (committed from other sources) ($)	**In-kind input** ($)	**Total** ($)
Total				

If possible, break costs down into cash being sought from funders, cash already committed from other sources, and in-kind contributions (from your organisation and/or other organisations). If you only provide a total, it should include all three of these.

Break down the budget in sufficient detail to allow a reviewer to check for consistency between the budget and your planned delivery mechanisms (Q4.1-4.3). For example, if your project includes funding for extension staff, indicate the number of extension staff and the cost per staff member (including on-costs such as superannuation and workers compensation insurance).

Include costs for activities that are tied to the project but are not necessarily directly about delivery, such as monitoring and evaluation during the current funding phase, reporting, project meetings, etc.

Suggested items to include in the budget:

Salaries

Extension officers/field officers
Project leadership/coordination
Administration/support
Technical support/research
Other

Operating costs

Payments to land/water managers
On-ground works (funded directly, not via payment to land/water managers)
Workshops/meetings
Travel
Monitoring and evaluation
Other

The information provided here should be consistent with previous questions, including Q4.1(a), Q4.1(b), Q4.1(c), Q4.1(e), Q4.2, Q4.3.#

Where does this information get followed up?

Costs are used in the calculation of the Benefit: Cost Ratio, which is reported in the Project Assessment Report.

The budget will be included in funding proposals or project implementation plans.

Example

Item description	**Estimated costs** Total for current phase of project (e.g. 3-5 years)			
	Cash (being sought for this project) ($)	**Cash** (committed from other sources) ($)	**In-kind input** ($)	**Total** ($)
Extension officer: 0.75 FTE per year for 5 years	500,000		100,000	600,000
Engage technical specialists	100,000		50,000	150,000
Payments to landholders				
Lucerne: $100/ha/year x 3500 ha x 5 years	1,750,000			1,750,000
Establishment of new native vegetation: $2000/ha x 300 ha	600,000			600,000
Protection of existing vegetation: $150/ha/year x 700 ha x 5 years	525,000			525,000
Weed and pest control	100,000			100,000
Monitoring and evaluation			50,000	50,000
Total	3,575,000		200,000	3,775,000

(c) The Estimated grand total project cost (C, in $million) is reported here, for calculation of the Benefit: Cost Ratio later.

C is the total cost for the current project, not $/year.

C	$

Consistency check 6

(a) Are the items listed in the budget consistent with the delivery mechanisms provided in Q4.1-Q4.3?

☐ Yes: go to Question 4.6

☐ No: Modify the budget or the delivery mechanisms.

For example, if payments to land/water managers are included, check that they are consistent with the payment levels specified in Q4.1(b).

If extension is one of the delivery mechanisms specified in Q4.1, check that extension agents have been included in the budget.

Q4.3(b) should have listed any knowledge gaps that need to be filled during the project (based on Q1.5, Q2.7 and Q3.6). Check that any investigation work listed is allowed for in the budget.

If you answered "Yes" to Q4.1(f), the following question will appear.

(d) Estimate the annual compliance costs for the private citizens who have to comply with the regulations that are enforced as part of this project (total cost across all citizens affected by the project, limited to those who do comply) ($/year)

E is the annual compliance costs resulting from the current project, converted to $million/year.

E	$million/year

Where does this information get followed up?

The compliance costs are used in calculation of the Benefit: Cost Ratio. It is assumed that theses costs are incurred every year for 20 years after the end of the initial 3-to-5 year project.

FAQs

Example

> It may cost $3 million per year for farmers in a region to change their land use from wheat farming to lucerne production over a specified area, to mitigate salinity. This would be their total compliance cost.

4.6 Long-term funding

Many environmental and natural resource problems require long-term interventions and ongoing management. If a project requires 20 years of ongoing investment to achieve its target, there is a risk that institutions or funding arrangements may change in various ways, resulting in abandonment of the project. Different types of investing institutions may also face different probabilities of surviving in the long term.

(a) Will funding beyond the time frame of the current proposed project be required to maintain the benefits generated by the project, or deliver the full benefits?

☐ Yes: got to Question 4.6(b)

☐ No: go to Section 5.

Self explanatory.

(b) How does this project fit into a long-term national, state or regional plan for these natural assets?

Provide information about any relevant long-term plan, its status, the institution with responsibility for implementing it, and the level of funding already committed to it.

Where does this information get followed up?

> The existence or non-existence of a long term plan influences the risk of not obtaining the required long-term funding (Q4.6(d)).

FAQ

305

Example

> There is no long term plan in place for this asset. It is anticipated that this project will involve the development of such a plan, to be funded and delivered by North Central CMA and the Department of Sustainability and Environment.

(c) After the completion of this project, what level of ongoing funding per year would be needed to maintain the benefits generated by this project? Specify the types of these ongoing costs and estimate their levels ($/yr).

Projects may require continuing funds, for example, for monitoring, enforcement, ongoing payments to landholders, additional on-ground works, repairs and maintenance, ongoing extension or technical support.

Complete the table provided.

From Q4.6(c) the estimated total ongoing funding per year (maintenance cost, M in $million), for calculation of the Benefit: Cost Ratio, is as follows:

M	$/year

Where does this information get followed up?

Long-term costs are used in the calculation of the Benefit: Cost Ratio, which is reported in the Project Assessment Report.

The level of funding influences the risk of not obtaining the required long-term funding (Q4.6(d)).

(d) What are the prospects for the required long-term funding being obtained?

☐ Very likely. The long-term plans and institutions are in place and funding committed. (Probability 0.9)

☐ Likely. The long-term plans and institutions are in place but funding is yet to be committed. (Probability 0.7)

☐ Possible. There is no firm long-term plan, institutional manager or funding in place, but there are good prospects of this occurring. Probability (0.5)

☐ Unlikely. There is no firm long-term plan, institutional manager or funding in place, but there are reasonable prospects of this occurring. Probability (0.3)

☐ Very unlikely. There is no firm long-term plan, institutional manager or funding in place, and the prospects of this occurring appear poor. Probability (0.1)

☐ Enter custom value for probability of long-term funding:

[If long-term funding not required, probability is set at 1.0.]

In assessing this risk, consider the magnitude of long-term funding required (Q4.6(c)) and whether there is a long-term plan for management of the asset (Q4.6(b)).

From Q4.6(d), the probability of obtaining long-term funding (*G*) for calculation of the Benefit: Cost Ratio is as follows:

G	

Where does this information get followed up?

It is used in calculating the Benefit: Cost Ratio, which is reported in the Project Assessment Report

It is also reported in the Project Assessment Report as a risk factor.

FAQ

305

4.7 Benefit: Cost Ratio

You don't have to provide any further information for this section. Once you have completed the required sections in other parts of the PAF, two key results are displayed in this section:

(a) The Benefit: Cost Ratio for the project (see Section 6 for details of the BCR).

(b) The Public: Private Benefits Framework. Results are displayed automatically if the project aims to influence the behaviour of private citizens.

The Public: Private Benefits Framework provides guidance on the appropriate choice of policy tool or delivery mechanism for the project to influence private citizens, depending on the levels of public and private net benefits from the project, relative to business as usual. It is intended for projects where the aim is to generate public benefits. If the aim is to generate only private benefits, then the Public: Private Benefits Framework is not relevant.

We estimate the position of each project on a simple two-dimensional graph (Figure 1) on which the central (0, 0) point represents business as usual. The boundaries of the areas for different policy tools are based on Pannell (2008) and Pannell (2009)[2].

It is not necessary that we be able to graph the project position with great precision. It is sufficient to locate the general area of the graph where a project is likely to lie, and to note which policy responses are likely to be appropriate, and which are not.

[2] Pannell, D.J. (2008). Public benefits, private benefits, and policy intervention for land-use change for environmental benefits, *Land Economics* 84(2): 225-240.

Pannell, D.J. (2009). Technology change as a policy response to promote changes in land management for environmental benefits, *Agricultural Economics* 40(1), 95-102.

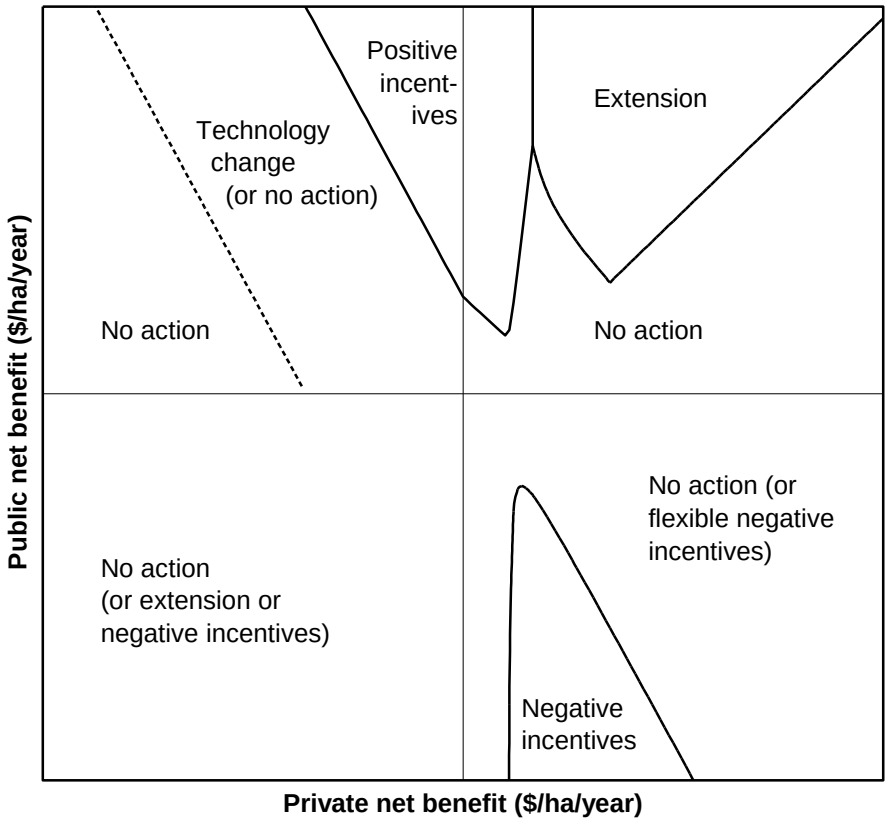

Figure 1. The allocation of policy tools to projects with different levels of public and private net benefits for a Benefit:Cost Ratio of 2.

You may have seen a similar but simpler looking figure than the one above. The version above accounts for complexities such as:

- the existence of lags to adoption, even when the project is one that ultimately delivers positive net benefits to the land manager.;
- the fact that extension reduces but doesn't eliminate those lags to adoptions;
- learning and transition costs to landholders who adopt a new practice;
- transaction costs or the environmental manager in delivering extension or incentive programs;
- a requirement for a higher threshold benefit:cost ratio to justify investment, given funds are limited and competition among environmental projects to use them is high.

Table 5 shows how the approximate position on the graph depends on:

(a) your response to Q3.3,

(b) the Benefit: Cost Ratio (BCR) for the project. In the electronic PAF this is calculated automatically.

(c) whether the main aim of the project is to encourage changes away from current practice (in order to provide benefits for natural assets), or to discourage changes away from current practice (to avoid greater damage to natural assets) (see Q3.2).

Table 5. Suggested delivery mechanisms depending on public and private net benefits of the project.

		Response to Q3.3 (Private Net Benefits)				
Project main aim	Benefit: Cost Ratio (Public Net Benefit)	Highly negative	Slightly negative	Neutral	Slightly attractive	Highly attractive
Encourage change away from current practice						
	More than 10	Technology change or no action	Positive incentives or technology change	Positive incentives	Extension	Extension
	2-10	No action	Technology change or no action	Positive incentives	Extension	No action
	0-2	No action	Technology change or no action	No action	No action	No action
Discourage change away from current practice						
	0-2	No action	No action	No action	No action	No action
	2-10	No action, extension or negative incentives	No action, extension or negative incentives	No action or negative incentives	No action or negative incentives	No action or flexible negative incentives
	More than 10	No action, extension or negative incentives	No action, extension or negative incentives	No action or negative incentives	Negative incentives	No action or flexible negative incentives

For more detailed background on the Public: Private Benefits Framework see here.

In part 4.7(a) of the electronic PAF, the position of the current project on the graph (Figure 1) is displayed. After that, in 4.7(b) there is another consistency check:

Consistency check 7

Is the suggestion at (a) consistent with the delivery mechanisms you have specified in Q4.1?

☐ Yes: got to Question 5.1

☐ No: consider whether you wish to modify your response to Q4.1.

FAQs

401, 402, 403

Section 5: Project details

5.1 Project title

Provide a brief title for the project (maximum 15 words).

Mention the asset and the key threat(s) addressed.

Example

> York Plains Wetlands: improved habitat and reduced salinisation through perennials

5.2 Project summary

Provide a short description of your proposal (maximum 150 words).

Provide brief information about the asset, specific project goal, actions to be implemented, their adoptability, delivery mechanisms, and funder's targets/outcomes.

Example

> The York Plains Wetlands are an important environmental asset in the Avon Richardson catchment of North Central Victoria. Eight wetlands, Avon River Reach 46, and high quality native vegetation will be protected and enhanced through an integrated series of measures. Grazing will be removed from 700 ha of native vegetation, 300 ha of native vegetation will be established, opportunistic cropping will be ceased on 350 ha of land and lucerne will be established and maintained on 3,500 ha at any one time, effectively preventing recharge on 7,000 ha of agricultural land. These changes will be delivered by payments to landholders, in the context of management agreements. Technical feasibility has been assessed through modelling, and the project has a high probability of success.

5.3 Funder's targets and outcomes

Identify targets and outcomes of the intended funder that this project will address.

This item is intended to assist with the development of an investment plan or funding proposal for the project.

5.4 Intermediate outcomes

Specify one or more intermediate outcomes, representing progress toward the overall project goals(s).

Like the project goals, these intermediate outcomes should be expressed as specific, measurable, time-bound targets. Explain the logic behind the selection of these intermediate outcomes and how they are related to the main project goal(s).

This item is intended to assist with the development of milestones for the investment plan or funding proposal. They will also be relevant to monitoring and evaluation of the project.

5.5 Names

Names of people responsible for completing this Project Assessment Form.

Provide the names of the person(s) who were primarily responsible for completing this form.

5.6 Date

When was this form last updated?

Self explanatory.

Below Q5.6 there is a button labelled “Print Full PAF”. To print all entered data, click the button. If you have a pdf printer driver installed, you can save the data to a pdf file.

For best results, in Page Setup, set the margins as follows. A4 paper: Left 20mm, Right 15mm. Letter paper: Left 1 inch, Right 0.5 inch

Section 6: Project assessment report

This provides a summary of the findings of the assessment, and of the project. This brief report may be provided to decision makers in the organisation to support strategic decision making about prioritisation of projects, or to external funders. The report can be generated automatically (once all essential information has been entered) by clicking on the tab for section 6, labelled “6. Report”. The contents of the report are as follows:

Project title [from Q5.1]

Project summary [Q5.2]

Project developed by [Q5.5]

Date [Q5.6]

Benefit: Cost Ratio [from BCR formula, explained below in section 6.1]

Time lag until most benefits of the project are delivered [Q2.3(a)]

Risk factors

(i) Practice change by private land/water managers. Probability of insufficient practice change (or of excessive uptake of adverse practices occurring despite project). [Q3.3 and Q3.4: calculated as $1 – (A \times B)$]

(ii) Socio-political risks. Probability of project failure due to non-cooperation by other organisations, or due to socio-economic, administrative or political constraints.
[Q4.4: calculated as 1 – *P*]

(iii) Technical feasibility. Probability that specified works and actions would not deliver specified outcomes.
[Q2.5: calculated as 1 – *F*]

(iv) Long-term funding. Probability that required long-term funding is not available.
[Q4.6(d): calculated as 1 – *D*]

Positive spin-offs identified [Q2.6(a)]

Negative spin-offs identified [Q2.6(b)]

Quality of Information

Section 1: Threats [Q1.5(b)]

Section 2: Technical effectiveness [Q2.7(b)]

Section 3: Practice change, socio-economic risks [Q3.6(b)]

Knowledge gaps [Q1.5(a), Q2.7(a) and Q3.6(a)]

Planned response to knowledge gaps [Q3.7]

6.1 The Benefit: Cost Ratio

The information to calculate the Benefit: Cost Ratio (*BCR*) is collected in the course of completing the Project Assessment Form (PAF). The variables that feed into calculation of the Benefit: Cost Ratio are mostly specified as proportions, and are included in the Index multiplicatively. Within this approach, there is no need to provide weights for each variable (as one would do in a Multi-Criterion Analysis). Indeed, given the way the formula is structured, introducing weights into the process would conflict with the logic of the approach. The BCR is broadly consistent with the "Project Prioritisation Protocol" of Manoney, Joseph and Possingham (2009)[3], although the BCR is more detailed and includes more elements.

The *BCR* is calculated as follows:

$$BCR = \frac{(VPPB \times A \times (1 - RF) \times DF}{TPVEPC} \quad (1)$$

where

VPPB = the value of potential project benefits, assuming that that the required works are fully adopted, and that there are no risks to project success and no time lags.

A = the proportion of required adoption of new works and actions that is expected to be achieved by the project. By definition, this is a proportion. Given the structure of equation (1), it is assumed that benefits are proportional to the level of adoption. If full

[3] Joseph L.N., Maloney, R. and Possingham, H.P. (2009). Optimal allocation of resources among threatened species: a project prioritization protocol, *Conservation Biology* 23: 328-338.

adoption is assured (e.g., the required works and actions will be undertaken by the organisation running the project) then $A = 1$. If adoption must be undertaken by private landholders or by another organisation, $A < 1$ would often be expected.

RF = the risk of failure of the project, so (1 – *RF*) repesents the probability that the project will not fail.

DF = the discount factor for the time lag on benefits. Consistent with standard economic theory, the discount factor is calculated as $DF = 1/(1 + r)^L$, where *L* = time lag until the majority of anticipated benefits from the project occur (years) and *r* is the real discount rate, assumed to be 5%. The way that discounting of benefits enters the formula in equation (1) is correct for a situation where the benefits of the project begin after a certain time lag and are then sustained forever.

TPVEPC = total present value of expected project costs, in dollars. As with the benefits, future costs should also be discounted to their present values to make them comparable in a logically consistent way.

Since *EPRA*, *RF* and *DF* are all proportions or probabilities, they must be multiplied into *VPPB*. If *VPPB* is measured in dollars, then, since *EPRA*, *RF* and *DF* are all proportions or probabilities, the numerator of equation (1) is also in dollars, and represents the expected value of project benefits. Note that equation (1) departs from the formula most commonly used in Multi-Criteria Analysis, where the variables are multiplied by subjectively determined weights, and added up to provide an index of benefits. That weighted additive approach would not accurately reflect the benefits calculated by equation (1).

In INFFER, the variables of equation (1) are further broken down as follows.

$$VPPB = V \times W \times 20 \quad (2)$$

where

V = the value of the environmental asset, assuming that the project is immediately successful.

W = multiplier for impact of works on asset value, as a proportion of *V*. What proportion of the asset's value would be protected or improved as a result of the project, assuming that it is immediately successful?

V is quantified using a scoring system, where each point represented a value of $20 million, hence the inclusion of 20 in equation (2) to express *VPPB* in millions of dollars. This means that the benefits index (the numerator of equation (1)) is measured in millions of dollars.

$$RF = 1 - F \times B \times P \times G \quad (3)$$

where

F = multiplier for technical feasibility risk (probability that the project will not fail due to problems with technical feasibility)

B = multiplier for risk of adoption of adverse practices (probability that the project will not fail due to adverse adoption)

P = probability that socio-political factors will not derail the project, and that required changes will occur in other institutions

G = probability that essential funding subsequent to this project will be forthcoming (e.g. this project may be the first phase in a longer project, or ongoing payments to landholder may be needed to retain the benefits generated by this project).

$$TPVEPC = C + \text{PV}(M + E) \times G \quad (4)$$

where

C = short-term cost of current project ($ million in total, over the three-year life of the project)

M = annual cost of maintaining outcomes ($ million per year, beyond the immediate project).

PV(*M* + *E*) = present value function to convert a stream of future annual maintenance costs and compliance costs (assumed constant in real terms) to a total equivalent present-day value (in $ millions). Assuming that the real discount rate is 0.05 and that the time frame for paying ogoing costs is 20 years, commencing four years after the start of the project, *PV*(*M* + *E*) = 10.7 x (*M* + *E*). The term *G* enters this equation as well, as it represents the probability that the costs *M* and *E* will actually be borne.

Substituting equations (2), (3) and (4) into (1), we get:

$$BCR = \frac{V \times W \times A \times F \times B \times P \times G \times DF \times 20}{C + PV\left(M + E\right) \times G} \quad (5)$$

where

V = value of the asset

W = multiplier for impact of works

F = multiplier for technical feasibility risk

A = multiplier for adoption

B = multiplier for adverse adoption

P = multiplier for socio-political risk

G = multiplier for long-term funding risk

DF_B = discount factor function for benefits, which depends on *L*

L = lag until benefits occur (years)

C = short-term cost of project

PV = present value function

M = annual cost of maintaining outcomes from the project in the longer term

E = compliance costs for private citizens, if the project involves enforcement of regulations.

Note that, other than *V*, all variables in the numerator lie between zero and one. This is the case for *W* and *A* because they are expressed as proportions of *V*, for *F*, *B*, *P* and *G* because they are probabilities, and for *DF* because it is a standard discount factor.

Details about each of the variables is provided in the PAF Instruction Manual. Below is a brief comment about each of them.

Asset value (V)

V is estimated in question 1.2(b) of the PAF. It is a score that represents the value of this asset, assuming that the asset is in good condition. The scoring range is calibrated such that a score of 100 corresponds to an asset of very high national significance (such as the Gippsland Lakes). Each point of the score represents a value of $20 million.

Impact of works (W)

W represents the proportional increase in future asset value that would result if the project was fully implemented (i.e. assuming that it is fully adopted) compare to if it wasn't. It is estimated in question 2.6(b) of the PAF. *W* is measured as a proportion of the total value of the asset (in good condition). This is done to allow easy comparability across projects.

Technical feasibility (F)

F is a proportion which represents the probability that the benefits generated would be at least as large as specified in *W*. In other words, it is the probability that benefits will not be significantly less than *W*. It is estimated in question 2.7(b) of the PAF

Private adoption of works and actions (A)

A is a proportion representing the probability that the on-ground works and actions specified in the project will actually be adopted, assuming that the project is fully funded and the project's delivery mechanisms are implemented. It is estimated in question 3.3(b) of the PAF.

Preventing adoption of adverse practices (B)

B is a proportion representing the probability that the project will not fail due to adoption of adverse works or actions, despite efforts by the project to prevent that adoption from occurring. It is estimated in question 3.4(b) of the PAF.

Socio-political risks (P)

P represents the probability that other socio-political factors will **not** derail the project. This includes the risk of non-cooperation by other organisations and the impacts of social, administrative or political constraints. The latter can include resistance to the project at the political level, bureaucratic approvals that would be needed, or opposition by local government. *P* is the probability that the project will not be prevented from reaching its goal due to one or more of these factors

Long-term funding risks (G)

G represents the probability that essential long-term funding will be available to continue to maintain the benefits generated by this project, or to complete the essential works commenced by this project. It is estimated in question 4.5(d) of the PAF.

Time lag to benefits (L)

L is the expected time lag in years until the desired bio-physical outcomes would be achieved. It represents the earliest time when a large proportion of the benefits will occur. It is estimated in question 2.5(a) of the PAF.

Discount factor ($DF_B(L)$)

Benefits that occur further into the future are a lower priority than similar benefits that occur rapidly. This is captured through the use of "discounting". The discount factor is calculated as follows:

$$DF_B(L) = 1/(1.05)^L \quad (6)$$

This assumes that the real discount rate (net of inflation) is 0.05. There is some debate about the appropriate discount rate to use for environmental projects. A real rate of 0.05 is a commonly used rate that is a little lower than rates commonly used for projects with financial outcomes, but not as low as argued for by a minority of the protagonists.

Up-front costs (C)

C is the sum of direct costs that will be incurred within the immediate time frame of this project – say, three to five years. This is a short enough time frame to ignore discounting (recognising that this simplification introduces a very slight error). *C* is recorded in question 4.4(b) of the PAF.

Ongoing or maintenance costs (PV(M))

Some costs may be incurred each year in the long term, such as monitoring and evaluation, or enforcement costs, or ongoing compensation payments. These costs, called *M*, are estimated in question 4.5(c) of the PAF.

To make them comparable to the up-front costs, we need to express them as a present value (*PV*). Calculate the PV as follows:

$$PV(M) = 10.7 \times M \quad (7)$$

This assumes that the discount rate is 0.05 and the time frame for paying these costs is 20 years, commencing in year 4.

Compliance costs (PV(E))

These costs are only relevant if the project involves enforcement of regulations, meaning that people are required to comply with the project even if they don't wish to. The compliance costs represent the total annual net costs to private citizens from compliance. They do not include the costs to the project or other agency from enforcing compliance, as these should be included in the project budget in Q4.5.

A useful way to think about compliance costs is that they are the amount you would need to pay to citizens to make them indifferent between complying and not complying. This would account for any benefits (including compensation) that they receive as a result of complying.

If the private citizens are compensated for their compliance, then the compensation costs would need to be included in the project budget (Q4.5(b)) and cost provided for 4.5(d) would be reduced by the amount of compensation provided. Thus, the compliance cost should be the uncompensated compliance cost.

E is the aggregate compliance cost, in $million, across all citizens who do comply. As with project maintenance costs, these are assumed to occur for 20 years from the end of the initial project, and to have a real discount rate of 0.05.

$PV(E) = 10.7 \times E$ (8)

Calculating the Benefit: Cost Ratio

We can now calculate the Benefit: Cost Ratio using equation (1). This provides an index that is comparable across projects, and provides an indication of the projects that should be higher in priority for public investment. The higher the value of the BCR, the higher the priority of the project (other things being equal).

For example, suppose the values for a project to enhance water quality in the Masterton Wetlands are as follows:

$V = 15$

$W = 0.25$

$F = 0.88$

$A = 0.7$

$B = 1.0$

$P = 0.98$

$G = 0.8$

$L = 20$; $DF_B(L) = 1/(1.05)^{20} = 0.38$

$C = 2.5$ (million \$)

$E = 0.2$ (million \$ per year); $PV(E) = 2.14$

$M = 0.25$ (million \$ per year); $PV(M) = 2.675$

Now, combining those values into the *BCR*

$$BCR = \frac{V \times W \times A \times F \times B \times P \times G \times DF \times 20}{C + PV(M + E) \times G} \quad (5)$$

gives *BCR* = 2.1. This value is compared with *BCR* values for other projects. The higher the value of the *BCR*, the higher the priority of the project. It is recognised that decisions would not be based solely on benefits and costs, but it should be a key input to decision making.

Comparing *BCR* across several projects to select a set for support, involves ranking the projects according to *BCR*, like this:

Project	Benefit: Cost Ratio	Budget
4	10.0	$3m
2	8.1	$13m
5	7.2	$1m
1	4.0	$6
6	1.1	$17m
3	0.8	$28m

If the available budget is, say, $17m then the analysis indicates that the greatest environmental outcomes from this investment would come from supporting projects 4, 2 and 5.

The *BCR* provides a score that is comparable across projects, and indicates which of the projects should be higher in priority for public investment. The higher the value of the index, the higher the priority of the project.

The *BCR* value required for a project to break even is 1.0. The 20 factor at the end of equation (1) is included to provide the intuitive result that the threshold value for the BCR is 1 (given that one point corresponds to a value of $20 million).

(To demonstrate, if the value for a particular asset X = $1 million, $W = 1$, $F = 1$; $A = 1$; $B = 1$; $P = 1$; $G = 1$; $L = 0$, so that $DF_B(L) = 1$, C = $1 million and $M = 0$, then the benefit: cost ratio for that project would equal 1. If the $V = 1$ corresponds to $20 million, then V for asset X = 1/20 = 0.05, and with this V, the *BCR* = 1. Thus if V is calibrated so that $V = 1$ corresponds to $20 million, then the break-even *BCR* value is 1.0.)

FAQs

601, 602, 603, 604, 605