INFFER version 1

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INFFER, the Investment Framework For Environmental Resources is a new asset-based approach to natural resource management. The core aim of INFFER is to help natural resource management (NRM) investors to achieve the highest value NRM outcomes that are possible with the available resources. It covers environmental threats such as water quality decline, salinity, biodiversity decline and pest plant and animals for the best public outcome. This document is to help people understand what is involved in applying the INFFER framework. What are we trying to achieve? What steps do we go through and why? How should asset values and adoptability be estimated?

We are aiming for more rigorous and systematic decision making about investments, whilst making it as easy as possible. Our starting point is to identify specific NRM assets, to base decisions around those assets and to think through the balance of investment that should be made between different types of assets. It is applicable to both dryland and irrigation areas, although the factors that need to be taken into account in each will be different.

A core component is The *Public benefits: Private benefits Framework*, which helps identify which policy tool, if any, should be used to promote changes in land management.

Steps in the process

The steps in applying INFFER in a region are as follows.

1. Consult widely within the region to understand local values and tap into local knowledge.
2. Identify potential assets. Starting the process with the assets helps to highlight the links between action and outcomes.
3. For each asset, collect the following information:
    - Relative significance to society of the different assets, considering both the scientific and community significance. Practically, they should be grouped into categories such as medium, high, very high and exceptional.
    - The types and levels of threats to each asset (level and timing of threat) or possibly an opportunity to improve the asset (level and timing of improvement).
    - Interventions that could be applied on the ground (e.g. fencing of remnant native vegetation, enhancing habitat, planting perennials over a certain area in dryland areas, salt interception schemes/engineering works in irrigation regions).
    - A tentative goal for the asset (e.g. recover habitat to a certain standard by a certain date, prevent a species extinction with a certain probability)
    - The technical feasibility of achieving NRM outcomes using those interventions (could be expressed as the cost of achieving the tentative goal with a certain probability, or the probability of achieving the goal within a given cost).
    - Whether the required intervention would have substantial adverse spillover effects on another issue, such as revegetation reducing downstream water availability.
    - The adoptability of those changes that are required on private land. After incentive payments cease, will the changes still be attractive to landholders? How much subsidy would need to be paid to make the practice adoptable on the required scale?
    - If they are not sufficiently adoptable, the feasibility of developing improved, more adoptable technological options.

4. Rate the uncertainty of information for each asset, and identify key knowledge gaps.
5. For each asset that requires changes on private land, use the *Public benefits: Private benefits Framework* to select an appropriate investment response (e.g. extension, incentives, R&D, engineering, no action). See below for more advice on this.
6. Produce a short list of assets that have good prospects for investment. Items could be excluded from the short list, for example, because they are not high enough in significance, not highly threatened, not able to be protected except at excessive cost, or because management responses are not sufficiently adoptable by land managers.
7. Conduct feasibility analysis of each of the short-listed investments, to check whether the tentative goal can be achieved.
8. If the goal for the asset cannot be achieved at acceptable cost, either remove the asset from the shortlist, consider modifying the goal to something more realistic, or consider whether development of improved options for management would provide a better avenue (e.g. new land management options that are both profitable and sustainable).
9. Considering the available budget, select particular investments. In doing this, weigh up the balance of the portfolio of investments between assets that require large, highly targeted investment in a localised area compared with assets that require investment over a large, dispersed area. For the latter to be chosen over the former, each ha of intervention would need to be particularly beneficial, and/or particularly cheap.
10. Identify likely NRM outcomes from each investment. Estimated/predicted NRM outcomes become the basis for the targets used for monitoring and evaluation. These targets should be achievable, time bound and measurable.

Steps 2 to 6 are designed to reduce the very long list of potential NRM investments down to a strong short list. The list needs to be short enough for detailed feasibility assessment to be practical and affordable. This is important so that we can have confidence that the finally selected investments will really generate worthwhile NRM benefits. The localised assets that end up being funded should be high in value, facing a high NRM threat, with high feasibility of reducing that threat, and high adoptability of the works needed to reduce the threat (or comparable wording if the issue is an opportunity rather than a threat).

Step 3 is the most time consuming. The distinction between assets that can be managed with a localised response and those that need a dispersed response is important. Management of localised assets may generate a relatively high benefit per hectare managed, so concentrated investment of resources is potentially warranted. This means that actions like engineering, relatively large incentive payments, and perhaps regulation may be justified, depending on other variables like the level of threat, the feasibility of management, and the adoptability of responses. Assets in the dispersed category require management over large areas and may have generate lower value per hectare managed relative to the localised assets. To compete with investment in localised assets, protection of such dispersed assets must be low cost per hectare treated, and highly effective, or else protect assets that are especially valuable. This affects the appropriate choice of policy tools (see below).

Waterways sometimes require management over very large scales, making them more like dispersed assets, but sometimes management may be targeted to a particular small element of the waterway, making them more like localised assets.

NOTE: Above we considered the steps needed to apply INFFER. The remainder of this document considers some aspects of application in more detail.

Applying the public benefits: private benefits framework (PPF)

This section relates to Step 5 of the INFFER process. The first thing to do in Step 5 is to consider whether the asset only requires management on public lands (e.g. a publicly funded, localised engineering response to salinity). If so, this would be assessed separately from the PPF, which relates specifically to changes in land management on private land.

For the remaining assets, the information about adoptability is used to locate the asset on the horizontal (private net benefit) axis. If it is highly adoptable at the required scale (e.g. solely providing information through extension would be sufficient to achieve rapid uptake), it would be far to the right. If it would require large, ongoing subsidies, it would be far to the left. The best prospects from an investment perspective are those where adoptability is marginal. In these cases, if grants are required, they do not need to be large, or if extension is appropriate as the front line tool (i.e. the practices are adoptable but there would be a long time lag before adoption), it can actually make a worthwhile difference.

The other collected information is used to locate the asset on the vertical (public net benefit) axis. First consider whether the intervention will have negative public net benefits. The prime example in dryland areas is planting perennials in high-rainfall catchments that give high yields of fresh water into waterways. The results of Nordblom et al. (2005) indicate that, in these cases, the value of maintaining freshwater runoff is highly likely to exceed the value of salinity reductions. These cases fall in the bottom half of the PPF graph.

Then consider dispersed assets. Is the nature of the asset such that benefits of action are low unless a large-scale management response is achieved? If so, it may be that the benefits of taking action will be low per hectare of land managed – that is, low relative to the benefits of protecting the best of the localised assets. Projects for these assets would be placed in the top half of the PPF graph, but only slightly above the horizontal axis. The public benefits of large investments on individual farms would need to be carefully assessed.

If the asset ideally requires a dispersed response but worthwhile local benefits can be gained with localised interventions, then the benefits per hectare of land-management change are potentially higher, depending on the value of that bit of the asset and how threatened it is.

Finally consider localised assets and small elements of waterways that can be managed and protected in isolation. In order for projects for these assets to be placed near the top of the PPF graph, they should have very high value, be facing very high threat, and have high technical feasibility of protection. Lower values for any of these criteria move the project down the graph. The technical feasibility of protection should be emphasised. If feasibility is less than high, it is likely that public net benefits will be substantially reduced.

How should the significance of the assets be determined?

Step 3, first phase. A reality of public funding for NRM programs is that the available funding is very small compared to the overall scale of the NRM issues we face. This means that we need to be careful in the targeting of investments. We are seeking to identify outstanding investment opportunities, rather than "average" opportunities.

As a consequence, great precision in valuing or ranking the assets is usually not needed. All we really need to know is whether an asset falls into the "exceptional significance" group. Beyond that, its priority will depend on the other criteria (degree of threat, feasibility of protection, etc.). "Very high significance" may be sufficient for a localised asset if it is exceptionally promising on the other criteria.

Estimation of asset significance may involve a combination of:

- 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 staff or committee members of the regional NRM body

Non-market valuation studies (surveys to assess the dollar value of an environmental asset) could conceivably be done as well, although our judgement is that it is not practical to do so for the large number of assets that need to be assessed.

How should adoptability be assessed?

Step 3, second last phase. The adoptability of on-ground works needs to be considered carefully. Here we are concerned with estimating the aggregate level of adoption, recognising that there will be variation due to individual perceptions and circumstances. We suggest:

- reviewing the existing literature about the farm-level economics of proposed land-management changes in the relevant areas.
- considering the available land-management options in the light of research evidence about the adoptability of different practices (Pannell *et al.*, 2006).
- observing actual adoption behaviour of land managers, with and without extension and/or small, temporary incentive payments
- talking to farmers and local experts

An additional option could be to conduct a conservation tender, to see how much subsidy landholders require in order to be willing to adopt a certain practice at a certain scale.

Advantages of the approach

- The approach produces a high-quality short list of top priority NRM investment options using only existing information, allowing well targeted feasibility assessment.
- The process is transparent, repeatable and internally consistent.
- It requires decision makers to be explicit about their assumptions.
- The framework helps environmental managers to recognised important knowledge gaps.
- It facilitates good integration of the many different sorts of relevant information.
- Clear and realistic targets for monitoring and evaluation emerge from the process.
- It provides stronger justification for realistic levels of funding to protect high value-assets and provides sound argument for further investigations if that is what is required.
- It assists with integration between asset classes as the region has an agreed set of priority assets and strategies that are transparently determined.
- It identifies the most effective policy tool for a particular context, broadening thinking about the options, and avoiding those that will be ineffective or have adverse impacts. For example, greater use of negative incentives may be considered.

References

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