Scorecard Approaches in Natural Resource Management:

Lessons and Paths Forward for the ESA Project Scorecard Application

February 2014

Prepared by Guy Greenaway

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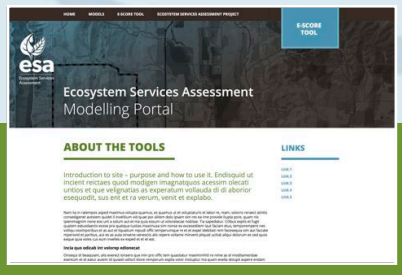

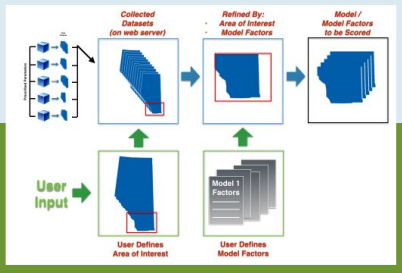

Prepared for the:

Ecosystems Services Assessment for Environmental Innovation and Competitiveness project

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Introduction

To inform the development of the Ecosystem Services Scorecard, a review of scorecarding approaches was undertaken. To scope the review, focus was placed on scorecarding resources and approaches that were either applicable very broadly (providing near universal lessons regarding scorecarding), or those applicable specifically to natural resource management. The review identified several types of approaches, the roles that could be played by scorecards, sample criteria and lessons regarding the needs for the development of credible score cards. Ultimately, a scorecarding approach was chosen based on the need to score the intended outputs of the project models.

This review did not include methods of ecosystem service assessment or valuation, except in the cases where a scorecard-type tool or approach was used. It is also arguable that comprehensive ecosystem service decision-support systems such as InVEST (Kareiva et al 2011), SolVES (Sherrouse et al 2014), and ARIES (Bagstad et al 2014) are scorecard systems of a kind, but they are not considered within this review as their comprehensive nature would be a poor fit for informing scorecarding as an end-use application.

Scorecarding Approaches and Functions

Scorecards are used to rate and integrate related but independent data points in a manner that provides an integrated yet simplified picture of overall performance. A score card is one type of assessment framework that results in a report or indication of the status, condition, or success of an initiative.

Most modern conceptions of scorecarding as a management tool likely draw – knowingly or unknowingly – from the work of Robert Kaplan and David Nolan at the Harvard Business School (Kaplan and Norton 1992) who developed and popularized the 'balanced scorecard' approach. Though used mostly in strategic planning and human resource management, their principle of using scorecards to add strategic, non-financial performance measures to assess alignment with a vision or desired set of outcomes has come to pervade many scorecarding approaches (BSI 2013), even those in natural resource management (Herbohn et al 2013).

However, applications of scorecarding in the natural resource management sector have tended to be limited (Roux et al 2011). Existing applications have centred around management effectiveness, report cards, and "state of" reports. Examples include use in measuring management effectiveness at the agency level (Figge et al 2002, Staub and Hatziolos 2004), assessing effectiveness of terrestrial or marine protected areas (Ervin 2003, Unnasch et al 2008, Hyde 2011), achieving regulatory compliance or certification of practices (EFD 2010), use by NGOs to measure management effectiveness (TNC 2004, Ervin 2003, Stolton et al. 2003), or use as an advocacy tool when framed as a 'report card' (WWF ND, Dyer et al 2008). Many "State of" reports

could also be considered to be a type of scorecard in that they identify and rate a series of key metrics (BRBC 2005, SEAWA 2011).

There appears to have been relatively limited use in measuring ecosystem services through the use of scorecards or scoring mechanisms (e.g., Adamus 2013), likely due to the newness of the concept in resource management theory. Most examples appear to be in the use of ecosystem service scoring for corporate sustainability reporting (Kaval 2011, Boulter 2011).

For any scorecard, there are specific uses to which it is to be put. However, scorecards, in general, are sought for a set of particular reasons; i.e., they are intended to play a particular role. When developing a scorecard, it is important to be clear on the specific role a given scoring tool is intended to play. Frost (2007) gives a good summary of the functions a scorecard can perform, and by extension, the roles that it might play:

1. Scorecards drive better performance.
2. Scorecards implement strategy.
3. Scorecards help ensure that you have the right measures.
4. Scorecards encourage balanced performance.
5. Scorecards point out what's missing.
6. Scorecards encourage good management.
7. Scorecards communicate—they tell the story.

Principles in Natural Resource Management Scorecarding

Every application of scorecarding is, of course, different, and local context is critically important. However, several successful scorecarding efforts have developed a series of critical questions, criteria, or structures that have general applicability.

Washington Biodiversity Council Scorecard

The Washington Biodiversity Council created the Biodiversity Scorecard (Kustudia and Gage 2010) to underpin an assessment of the state's biodiversity and its human and biophysical attributes. The intent was to inform legislation, policy, and management and to assess actions. Several aspects of their tool's principles and execution are informative. Overall, the Biodiversity Scorecard was formed to:

- Relies on state-of-the-science techniques employed around the world.
- Uses indicators that are selective enough to provide precision, but broad enough to draw key ecosystem relationships.
- Includes the effects of human actions and the benefits we derive from the natural world.
- Offers a snapshot in time and serves as a baseline to chart trends.
- Provides an overall index of the state's natural wealth (Kustudia and Gage 2010).

The principles underlying the Biodiversity Scorecard's development were:

- Use the best available and appropriate science.
- Select a sufficient number of indicators but no more than necessary.
- Conduct an objective assessment free of "grades" or rankings that could imply advocacy.
- Separate indicators from specific policy or regulatory definitions.
- Maintain and update indicators in a neutral forum, separate from policy- and decision-making.
- Allow for advances in technology and scientific understanding.
- Integrate citizen science both to collect valid, cost-effective data and to engage the public.
- The researchers used these principles as well as additional guidelines from the literature to develop criteria for examining a potential indicator (Kustudia and Gage 2010).

The criteria for the Biodiversity Scorecard's indicators were:

- Is it quantifiable?
- Is it measurable and meaningful at different time scales (short term and long term) and different spatial scales (such as in a watershed, a county, or across the whole state)?
- Is it especially relevant to measuring status and trends in one of the four indicator categories?
- Does it contribute to the scorecard's comprehensiveness?
- Is it particularly sensitive to change so it could provide an early warning, like a canary in a coal mine?
- Does it describe something notable about nature's benefits to people (ecosystem services)? (Kustudia and Gage 2010)

E.VALU.A.TE Natural Capital Guide

The *E.VALU.A.TE* guide developed at the University of Cambridge is intended to help assess natural capital from the perspective of understanding externalities (Schaafsma and Cranston 2013). The guide uses a step-wise process for scoring sustainability which is instructive in understanding how they relate data collection and scoring:

1. Understand externalities,
2. Scenario selection (What scenario do I want to assess?),
3. Activities and impacts (What impacts do I want to consider?),
4. Models and data (What data do I need to undertake this assessment?),
5. Human welfare impact (How do environmental changes impact human welfare?),
6. Valuation (What kind of value data do I need?)

TEEB for Local and Regional Policy Makers

TEEB's approach for incorporating ecosystem services into local decision making lays out six steps, with the suggestion that scoring could be based on the steps or scorecards could be used within each step (TEEB 2011):

1. Specify and agree the policy issue with stakeholders to avoid misunderstandings during decision making and implementation.
2. Identify which ecosystem services are most relevant to the policy issue in order to focus analysis.
3. Define the information needs to tackle your issue and select appropriate methods for assessment.
4. Assess ecosystem services, expected changes in their availability and distribution.
5. Identify and appraise policy options based on your assessment.
6. Assess distributional impacts of policy options on different groups in your community.

Analysis of Needs for ES Scorecarding

Examining the principles and the best practices in the scorecarding approaches reviewed, there are several themes that arise which have applicability for the ESA Score Card and Web Portal.

Reference Scoring System to Desired Outcomes

Virtually all scorecards reviewed speak in their principles or their application to the need to tie the structure and measures of the scoring system to a clearly-articulated set of desired outcomes to ensure legitimacy and relevancy. Herbohn et al (2013) further suggest tying that articulation of outcomes directly to an assessment of capacity of the organization/agency intended to achieve them. Miles et al (2010) advise focusing scorecards specifically on particular resource management activities. Raudsepp-Hearne and Kerr (2011) also make the link to the importance of this focus for resource-limited scorecard users.

Develop Meaningful Measures

The importance of getting the measures right arose as a common theme, often tied to the point above regarding links to desired outcomes. Various scoring approaches emphasized focus on choosing relevant indicators, choosing the correct metrics, and including decision makers, ecological experts and modellers in this exercise.

Establish a Credible Baseline

Most scoring system authors emphasized in some way the need to create a baseline against which to score, emphasizing the importance of consistency in metrics and scale, and also the

need for validation. The more specific the scoring application, the more emphatic the direction to establish a baseline (e.g., protected areas scoring systems – Hyde et al 2011, Unnasch et al 2008 – suggested scoring against pristine conditions or base measures of ecological integrity).

Base on Modelling Exercises

Several scoring systems made specific reference to the importance of modelling as an underlying basis, providing projections of plausible futures (scenarios) to assess or score. There was a recognition of the limitations in data and concrete conceptions of potential futures and potential implications. Raudsepp-Hearne and Kerr (2011) suggested the modelling exercises should be directed to demonstrating the potential impacts on people and businesses in a particular area.

Involve Intended Users in Scorecard Development

All scorecard examples reviewed underscored the importance of involving the intended users of the scoring system in its development, usually in an iterative process. Links were made between engaged involvement and both the effectiveness and the likelihood of use. Herbohn et al (2013) emphasized the need for organizational commitment and further suggested value in measures of the managers' receptivity to change in general. TEEB (2011) suggested roles for user and stakeholder involvement could include prioritization and assessing feasibility in terms of catalyzing effective local policy action.

Heed Data and Capacity Constraints

Most scorecard methodologies reviewed made mention of tailoring the scorecard to the constraints that arose in application. Those scoring systems that delved further into the mechanics of the scoring system emphasized the need to heed data constraints such as availability, applicability, and scalability. Scoring systems that focused on management effectiveness or agency-specific applications emphasized the need to heed constraints such as personnel, budgets, and organizational appetite for change.

Expert Involvement in Ecological Conditions Questions

Those scoring systems that included detailed consideration of ecological condition/projection questions stressed the importance of involving the ecological experts in the design of the scoring questions and system. Hyde et al (2011) suggested the process used to reach consensus amongst the experts on ecological conditions could be as important as the associated scoring assessment.

Graphical Representation

Though not always mentioned specifically, the accompanying materials for the reviewed scorecards implicitly indicated a value in graphically representing the outputs of the scorecard, scoring system or assessment. However, none of the processes reviewed – including those either explicitly or implicitly referencing this aspect – appear to have a sense of how this characterization would look or the role that it would play in achieving their overall objectives.

Conclusion

As described above, this review provided many valuable lessons on principles and practice in natural resource management scorecarding. Looking across all of the lessons offered, one theme cut across them, which was pragmatism. That is, a scorecarding mechanism needs to be directed and constrained by the circumstances of the scorecarding effort (i.e., data availability, user need, management context, etc.).

The *Ecosystem Services Assessment for Environmental Innovation and Competitiveness* project is a model-based approach to understanding, valuing and employing the ecosystem services concept. The 'Core Project' is the mapping and modelling of five ecosystem-service-related dynamics, with several ancillary application and advisory activities designed to inform or derive use from the modelling efforts (see Figure 1: *Ecosystem Services Assessment for Environmental Innovation and Competitiveness* project schematic).

The project structure, combined with this review, highlight (and allow focus in) four of the above-noted themes in the ES Scorecarding needs review, namely: Base on Modelling Exercises, Expert Involvement in Ecological Condition Question, Heed Data and Capacity Constraints, and Graphical Representation. Collectively, these suggest that the most efficient approach to developing a scorecard within the expressed needs of the project is by focusing scorecarding efforts on the project models and the modellers. More specifically, the rationale is:

Base on Modelling Exercises – As the project centrally focuses on the development of the five ES models as the 'core project', so then should the scorecard. Many of the questions of applicability and use identified above can be assumed to have been addressed in the on-going efforts to advise, inform and refine the modelling exercises.

Expert Involvement in Ecological Condition Question – Each ES model was developed with considerable expertise in both the modelling realm and the realm of the ecological issue which the model considers (biodiversity, range production, timber and carbon, pollination, and water purification). Questions of ecological function and condition were previously addressed in the development of the models and their input parameters.

Heed Data and Capacity Constraints – The development of the models implicitly contains the results of any consideration of data constraints. In other words, model outputs inherently represent the data constraints and their management which the scorecard must consider. The capacity constraints may not be addressed in this manner, which the author flags here, but recognizes is out of the scope of the ESA scorecarding sub-project.

Graphical Representation – The ES models are all capable of producing spatially-explicit datasets, either natively or with minor conversion. A scorecarding mechanism can be linked to this capability to produce graphical representations (in this case, maps) of each model output and its derived score.

The approach going forward for the ESA scorecard developed in this project will focus on the project's models, working directly with the relevant modellers to ensure workable and credible links between the scorecard and the Core Project models.

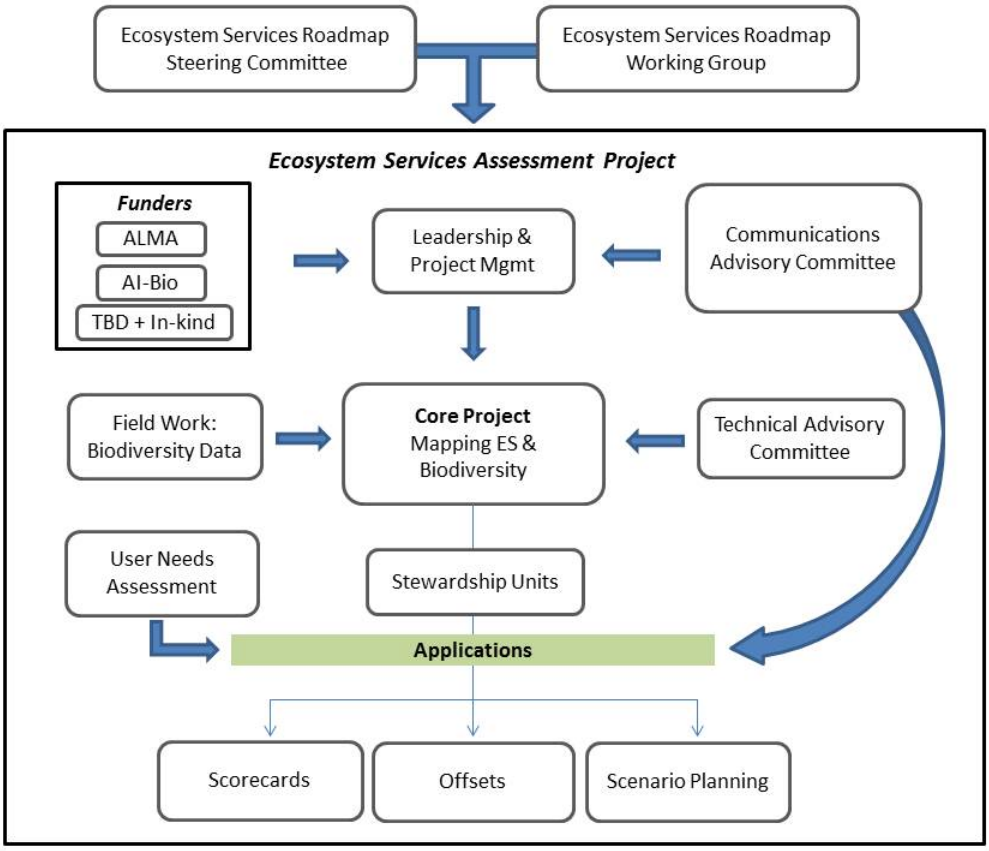

Figure 1: *Ecosystem Services Assessment for Environmental Innovation and Competitiveness* project schematic.

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