

# The Approaches, Issues and Outcomes of Regional Studies of the Savannas of Northern Australia.

Richard Monypenny

A/Prof Richard Monypenny is with the Department of Economics, and the Savannas CRC  
at James Cook University, Townsville Qld. 4811

Telephone (077) 81 4869; Facsimile (077) 81 4149; Email Richard.Monypenny @jcu.edu.au

**Abstract** This paper is about a review of existing regional studies of the tropical savannas of Northern Australia that is being undertaken for the Savannas CRC. The review draws on the past and present successes and failures of regional studies in the savannas, to provide a better understanding of the role of regional studies in providing better management options for land managers and policy makers. This understanding is the foundation upon which to develop and to evaluate regional growth and development recommendations for the on-going sustainable development of the tropical savannas. The review has a descriptive stage, followed by an evaluation stage. The end product of the review is the description and evaluation of the approaches, issues addressed and the outcomes, findings, and recommendations made in these studies. This review is part of an attempt to obtain an improved understanding of the wider sustainable development of tropical savannas in Northern Australia. This attempt uses an appropriate framework and theoretical underpinning and information, data and knowledge sources to obtain this understanding and to identify models that are seen as relevant by stakeholders. Progress to date is encouraging.

## 1. INTRODUCTION

The establishment of the Savannas CRC (Cooperative Research Centre for the Sustainable Development of Tropical Savannas) has provided a considerable challenge to modelling and simulation practitioners. Most, if not all, the systems connected with the savannas are as challenging as can be found anywhere. They are mostly large, geographically disperse, highly variable, often fragile, highly inter-dependent and dynamic systems. I am interested in a system that I have called "The sustainable development of tropical savannas in Northern Australia". Specifically, I am interested in the complex social, ecological and economic features of this system.

My interests with this system are at the following levels:

1. To understand the system
2. To use this understanding to suggest proposals to change the system
3. To use this understanding to evaluate proposals to change the system
4. To use this evaluation to determine likely consequences and implications if these proposals were implemented
5. To use this evaluation to make recommendations on the support that could be provided for the implementation of these proposals.

More specifically, what I am attempting to do is to be able to evaluate proposals to change the system so that the Savannas CRC can make recommendations about the implementation of these proposals.

There are three main challenges in understanding the system: first, to use the framework and theoretical underpinning to describe and to explain the system. Second, to communicate with stakeholders to transform this description and explanation into an understanding. Third, to validate this understanding in such a way that it is convincing to stakeholders. I hope that this conference will be of significant help with the third challenge.

Progress to date has reinforced my interest in pursuing these three challenges.

The paper continues with brief descriptions of the framework and theoretical underpinning, the review of regional studies and the survey of current stakeholders. The balance of the paper is about the regional studies taken themselves as a system.

## 2. FRAMEWORK

To understand and communicate about this system will require four steps: To describe the various aspects of this system; To provide likely explanations underlying these descriptions; and To validate the understanding thus obtained. This understanding will then help the Savanna CRC to evaluate proposals to change this system and to make recommendations about the implementation of these proposals. The fourth step is communication. It is concurrent with each of the other three steps.

The tools for the descriptive step are: Rich picture diagrams for the softer aspects of the system, from Soft Systems Methodology as, for example, Checkland and Scholes (1991) or Flood and Jackson (1991). Causal loop diagrams for the harder aspects of the system, from Systems Dynamics as for example Senge (1990). These same tools will also be used to represent and to help communicate the outcome of the explanation and the validation steps and for the wider communication between the three steps and the stakeholders.

The tools for the explanation step are: Systems thinking for the overall and general complexity and interconnectedness of the system, from the general systems literature, as for example Barton (1996). Stages theory from the regional economic growth and development literature, as, for example, Hayami and Ruttan (1960), Hoselitz (1960) and Parr (1997); but modified to clarify the distinction between growth (growth in the volume of GDP), development (growth in the per capita GDP), scale of throughput and pattern of throughput Daly (1995 p 623). Market behaviour from the strengths of mainstream

economics, as, for example, Daly (1995 p. 624). The weaknesses of mainstream economics from the ecological economics literature, as, for example, Sagoff (1995), Common (1995), Cassidy (1996), Quiggin (1997), and Hamilton (1997).

Tools for the validation step are yet to be confirmed. I hope that this conference will be of significant help with this point.

### 2.1 Information, Data and Knowledge

The information, data and knowledge that will help develop our understanding of this system comes from four sources: Regional studies of various types that have been undertaken in the past within or related to this system. Copies of these studies are being obtained by a survey. The regional studies themselves viewed as a system (rather than the review of these studies) are being studied. The past and current characteristics of the system (Sustainable development of tropical savannas) itself are being described by experts. Current stakeholders in the system are being interviewed with a semi-structured questionnaire. The softer aspects of these sources are being described using rich picture diagrams, the harder aspects, using causal loop diagrams.

### 3. THE REVIEW OF REGIONAL STUDIES AND THE SURVEY OF STAKEHOLDERS

The review of existing regional studies that have been undertaken of the tropical savannas of Northern Australia is being undertaken for the Savannas CRC. The review draws on the past and present successes, and failures of regional studies in the savannas, to provide a better understanding of the role of regional studies in providing better management options for land managers and policy makers. This understanding is the foundation upon which to develop, and to evaluate regional studies recommendations for the on-going sustainable development of the tropical savannas. The review has a descriptive stage, followed by an evaluation stage.

The descriptive stage reviews the regional studies in terms of:

1. Approach, principles, and procedures used
2. Issues addressed
3. Explicit or implicit underlying aims
4. Origin or impetus for the study
5. Outcomes, findings, and recommendations made
6. Events since the study.

The evaluation stage is an evaluation with the benefits of hindsight, of the studies, of the events since the studies and of their relevance to the sustainable development of the savannas of Northern Australia. For a recent, partly related study, see Dale and Bellamy (1996).

Current stakeholders in the system are being interviewed with a semi-structured questionnaire. The balance of the paper is about the regional studies taken themselves as a system.

### 4. THE REGIONAL STUDIES TAKEN THEMSELVES AS A SUB-SYSTEM

The work on the existing regional studies of the tropical savannas of Northern Australia themselves taken as a sub-system, rather than as a review, is based within a systems thinking framework, and is asking the question: (1) What can we learn from all the regional studies that have been done, taken as a whole or as a sub-system that may help the tropical savannas survive?; Or if we are more pessimistic, (2) Is there anything that we can learn from these studies that will help the savannas and us both survive?

I am attempting to answer this question by using the characteristics of the existing regional studies themselves. The characteristics of the regional studies which appear, at this stage, to be the more important ones are:

- 1.- The regional studies can be seen as a sub-system, and it has social, ecological and economic features.
  - 2.- The sub-system is large and diverse. It is large because it includes parts of Queensland, the Northern Territory, and of Western Australia. It is diverse physically, geographically, morphologically, climatically, in soils and in dominant economic activity.
  - 3.- A significant number of sub-sub-systems can be identified.
  - 4.- The boundaries of the sub-sub-systems are usually multiple, unstable and permeable.
  - 5.- Some sub-sub-systems have many aspects in common (for example, regional transport and grazing), some have few aspects in common (for example, regional transport and conservation).
  - 6.- It is not likely that there is an unambiguous hierarchy of sub-systems. I expect that the hierarchy depends on who is looking and from what point of view, for example, the difference between a grazier and civil engineer looking at the same river catchment used for grazing cattle.
  - 7.- Many of the sub-sub-systems are highly buffered. For example in the grazing sub-sub-system, available feed is highly buffered because it can be stored in situ; livestock survival is highly buffered by cattle storing fat in the body; reproduction is highly buffered because cows are less likely to fall pregnant when they are under-weight than when they are fat.
  - 8.- There have been various attempts at regional improvement to make regions more sustainable. With the aid of hindsight many can now be seen to have failed. What can we learn so that current attempts are less likely to fail?
  - 9.- All decisions are made in a historical time-frame and context. Furthermore these contexts change.
  - 10.- All decisions are made by people as individuals or as groups. These individuals or groups have their own private agenda and can be influenced to change their agenda and their decision.
  - 11.- The impact that these decisions have on the system are interpreted differently as the context changes and as the stakeholders learn, change and evolve.
  - 12.- There is likely to be a difference between decisions taken in the best interests of individuals and decisions taken in the best interest of many individuals. For example, one grazier may decide not to control a weed, but the welfare of all the graziers in a catchment will be increased if the weed is controlled. When this difference exists there needs to be a process to arrive at this decision.
- ### 5. IMPLICATIONS THAT CAN BE DRAWN FROM THESE CHARACTERISTICS
- By using the framework and theoretical underpinning to look at the above characteristics of the regional studies themselves as a sub-system we obtain some understanding. From this, we can suggest the following implications or likely outcomes of efforts

to explore the sustainable development of regions of the savannas: (the numbers relate to the numbers under Characteristics, above).

1.- Given that we are dealing with systems, we know that the system (or the main sub-systems) will be more than the summation of the parts. This means that we can expect externalities will play a significant role.

2.- Given that the system is large and diverse, we can expect both a significant lack of information and considerable measurement problems.

3 to 5.- Given that there are significant sub-systems, we can expect that there will be significant interdependence between these sub-systems.

6.- Given that it is not likely that there is an unambiguous hierarchy of sub-systems, we can expect that there will be a wide range in the focus of interest between different stakeholders.

7 and 8.- Given that many of the sub-systems are highly buffered, it is likely that it will be difficult to interpret past successes and failures, and to see short term outcomes, consequences and implications of management actions or options.

9 to 11.- Given that decisions are influenced by the time-frame, by private agendas, and by the accepted norms of the time, it is likely that it will be difficult to relate past experience to current challenges.

12.- Given that it is likely that the difference between the interest of individuals and the interest of the whole is due largely to externalities, we need a process to identify and account for externalities.

With hindsight, these implications, drawn from the characteristics of the regional studies themselves are in fact a significant contribution towards understanding this system.

## 6. WHY USE THE CHARACTERISTICS?

The reason that I have attempted to see what I can learn about the system from its characteristics, is because of the system itself and because of what I want to achieve. I know that there is considerable circularity here (that is, I view the system this way because that is the way I see the system). However, this is part of the challenge that we face in using systems thinking. I see the following reasons to support my approach:

1.- We want to better understand the system so that we can better predict the outcomes, consequences and implications of management actions or options, on say sustainable development, rather than just wanting to understand the system. This is because decision makers usually deal with holistic problems.

2.- Why would we expect that there is only one representation of the system? No, we would expect many different ways of representing the system. Furthermore, it is likely that there is no single dimension of the system with which we can measure progress in the system or even in a given sub-system. If we take sustainable development as the progress that we want to measure, it is unlikely that there will be one answer or one way to make sustainable development of the savannas.

3.- It is likely that many or most of the stakeholders that focus on one sub-system (for example, a grazier focusing on the grazing sub-system), recognize the inter-dependence between that sub-system and the other sub-systems and make decisions accordingly.

4.- Given that my interest is to evaluate proposals for change in the system, we need an overall representation of the system that is relevant to stakeholders. Furthermore, the measure of change in this system needs to be one that explicitly recognizes, the pluses and the minuses of any change in each of the social, ecological and economic aspects of the system. That is, at a macroeconomic level, that the measure be less like the conventional GDP and more like green GDP. (See, for example, Pozzebon, 1997). At the level of cost-benefit analysis, that the measure be sensitive to the social, ecological and the economic aspects of the system (See, for example, Monypenny, 1997).

Given these reasons, I suggest that using the characteristics of regional studies themselves appears to contribute to a pragmatic approach to understanding this specific system. I hope that a similar outcome will eventuate from work along similar lines with the past and current characteristics of the system (Sustainable development of tropical savannas) itself and with the current stakeholders.

## 7. CONCLUSION

I am attempting to understand a system. I am trying to find a way of understanding this system, and of communicating about this system with stakeholders in a way that is relevant to their decision-making. I want it also to be as intuitive as possible for the stakeholders.

From Systems Thinking I expect that we will need more than one way of looking at the system. In the extreme it could be a different way for each of the stakeholders. It could be that each stakeholder focuses on one part of the system, that is relevant, but in spite of this narrow focus that they recognize the inter-dependence with other parts. Using the characteristics of the system will help us understand and communicate.

There is some circularity in this: I view the system this way because that is the way I see the system. However, progress to date has reinforced my interest in pursuing the regional studies, the characteristics of the system and the current stakeholders, as three sets of information, data and knowledge that will help develop our understanding of this system and of communicating about this system with stakeholders.

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