

## *Abstracts*

WALTER, G.R.: "Information, Indicators and Accounts: A Regional Sustainability Perspective". This paper addresses the problem of developing information to support strategic planning and management directed toward achieving sustainable regions. The discussion arises out of concern for the largely unexamined macro-policy bias of current thinking about regional sustainability information systems. These approaches are inspired by the policy success of national economic accounts. This review argues that the inclusion of environmental, ecological and social considerations raises difficulties, of locational specificity, incommensurability, and the coordination of many actors, which require a decentralized information system. A means of marshalling and linking locally held information is needed, supplemented by a means for local utilization of the information generated by other management levels or by a sectorally compartmentalized bureaucracy. Once an information system is in place, it can support the development of various indicators, accounts or other summary measures useful for policy purposes.

In the course of the argument, macro-policy information models, including the national accounts framework, social indicators and social accounts, environmental indicators, green accounts, patrimonial approaches, and the stress/response framework are briefly reviewed. Emphasis is placed on the role of economic and other micro-agents relevant to regional sustainability. A brief review of the major regional policy planning frameworks, in the context of information needs, is undertaken.

The paper concludes that an important component of the way forward to regional sustainability is to develop an information system involving monitoring, databases, information exchange, regional accounts, indicators and other information tools, as appropriate to the particular scale and policy problems of concern to a given locality or region.

PRUDHAM, W.S., and S. LONERGAN: "Natural Resource Accounting (I): A Review of Existing Frameworks". Growing concern with the relationship between ecology and economy have resulted in the development of resource accounting methodology. Resource accounts are generally understood as satellite or additional information linked to existing national economic accounts, allowing for the correction of income aggregates to reflect natural asset depletion and depreciation. Yet, resource accounts are also sources of environ-

mental information and, as such, may help to satisfy broader management objectives. To do so, these objectives must be considered during the design of resource accounting systems. This requires consideration from a multi-disciplinary perspective. This paper reviews some of the significant developments in resource accounting methodology and establishes a research agenda for further work in this area. Particular emphasis is placed upon the development of independent, multi-objective accounting systems as opposed to satellite accounts to national economic tables.

PRUDHAM, W.S., and S. LONERGAN: "Natural Resource Accounting (II): Toward the Development of a Regional Model". In a companion paper, we discuss the development of resource accounting methodology and give an overview of the literature. Here, the specific issue of regional resource accounting is addressed. Building regional accounts is important because environmental management objectives require the maintenance of environmental information systems for which national scale models are poorly suited. Thus, resource accounts which accommodate ecologic and economic objectives must be spatially disaggregate. We describe some of the issues facing the process of disaggregating from the predominantly national focus which presently exists in resource accounting. These issues include the usual data problems with spatial aggregation and delineation, and the lack of spatial correspondence between existing socio-economic and biophysical databases. We then describe a regional accounting system devised for use on Vancouver Island, British Columbia.

BUTTERFIELD, D.A., and A.A. KUBURSI: "Regional Economic Effects of Recycling in Ontario". The incremental employment effects in Ontario regions of several alternative packages of Ontario waste management initiatives, as well as U.S. recycling initiatives, are estimated for the years 1992 and 2000. A reference scenario, based on forecasts of the effects of current Ontario waste management policies is compared to scenarios based on the addition of new policy initiatives. Each scenario incorporates revisions of the final demand vector, waste generation coefficients for all sectors, input shares and technologies in production, and regional shares of production in each industry. The results suggest that U.S. recycling initiatives will lead to substantially larger employment losses than Ontario initiatives because in Ontario initiatives declines in production in primary industries are partially offset by employment increases in recycling activities. Relative employment losses associated with both U.S. and Ontario recycling initiatives are largest in Northwestern Ontario.

MANNING, E.W.: "Accounting for Sustainability: Lessons From the Swamp". There is a pressing need to broaden the criteria used to measure wellbeing at a national and regional level to include environmental concerns. One approach is to modify the indicators used in economic accounting procedures. Work directed at establishing the values which derive from the speci-

fic functions supported by the environment show that many of the most important values will be very difficult to quantify. A five-year wetland evaluation project has revealed major problems in establishing the existence of specific functions deriving from the biological and physical characteristics of the environment. Further, both the existence of benefits deriving from these functions, and in particular the sensitivity of these benefits to changes in the environment were in many cases impossible to document. Attempts to build more holistic resource accounting will likely be incomplete because of these key problems in measuring many of the most important values deriving from the environmental base.

COCKLIN, C.: "What does Cumulative Effects Analysis have to do With Sustainable Development?". A review of selected theoretical discourses on sustainable development reveals the inadequacies of conventional approaches to environmental assessment and management. In contrast to the managerialist approaches that have prevailed so far, planning for sustainable regional development demands the better integration of development objectives (social, economic, environmental), a more proactive approach to environmental management, and an improved conceptual framework within which to describe and analyze environmental change. The notion of cumulative environmental change and its assessment presents an appropriate basis for improvement. Effective planning in support of sustainable regional development will require that cumulative environmental effects assessment must be administered at a regional scale. There is also a pressing requirement to develop methods appropriate to the task of assessing the impacts of cumulative environmental change.

WALKER, R.: "Deforestation and Economic Development". This paper considers deforestation processes in developing countries, and compares them to what occurred historically in so-called developed countries. Data are presented showing the existence of a landscape turnaround in developed countries, whereby the expanse of forest reached an historic low on a country-wide basis, and then recovered its domain in areal terms. The link between economic development and deforestation is investigated, as is the role played by forest and forest land values in affecting the pace of groundwater conversion. It is hypothesised that global economic integration and dualism within developing countries are causing a deforestation process different from that experienced historically in temperate areas. The implications of this difference are considerable, both with respect to global sustainability and policy.

SMIT, B., and J. SMITHERS: "Sustainable Agriculture: Interpretations, Analyses and Prospects". There is wide variation in the ways in which sustainable agriculture is analyzed and promoted. This paper reviews several of the more prevalent interpretations and applications of sustainable agriculture. It is suggested that differences in the concept can be attributed to what is meant by

'agriculture' and 'sustainable', as well as to the scale of consideration. Four prominent themes in the field of sustainable agriculture are outlined: eco-farming, agroecology, food sufficiency and equity. The paper then examines perceived obstacles to agricultural sustainability in Canada, and illustrates the potential of numerical modelling as a method of assessing sustainability from a food sufficiency point of view.