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Ecosystem Services and Human Well-being: Do Global Findings Make Any Sense?

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The Millennium Ecosystem Assessment (MA; 2005) defined ecosystem services as the benefits ecosystems provide that contribute to human well-being. Ecosystems supply a bundle of services, including provisioning services such as timber, food, and fiber, that provide material wealth—a key constituent of well-being. The indicators presently used to measure and track well-being are primarily direct measures of current material wealth, including the gross national product (GNP) per capita and, to a large extent, the Human Development Index (HDI). It was therefore no surprise that the MA reported that two-thirds of assessed ecosystem services were declining while global well-being had increased over the last fifty years—although one might expect that decreases in ecosystem services should also decrease human well-being.

The authors of "Untangling the Environmentalist's Paradox: Why Is Human Well-being Increasing as Ecosystem Services Degrade?" (Raudsepp-Hearne et al. 2010) attempted to explain the apparent paradox by positing the following four hypotheses: (1) there is a flaw invalidating the measures of well-being used in the MA, (2) the benefits of food production outweigh the costs of losses in other ecosystem services, (3) technology decouples the link between ecosystem services and human well-being, and (4) time lags exist between loss of ecosystem services and impacts on well-being.

Raudsepp-Hearne and colleagues rejected the first hypothesis, but the indicators they chose closely resembled those used in the MA. The analysis centers on the estimates of poverty made by Xavier Sala-i-Martin, of Columbia University, and the HDI; however, both indicators recently have come under intense criticism. Reddy and Pogge (2009) and Sen (1999) showed how GNP per capita and the poverty line ignore other constituents of well-being (such as social relations, security, health, and, particularly, freedoms and choices) by concentrating solely on material wealth. The HDI does better, by including measures of human health and education, but a paper by Sagar and Najam (1998) demonstrated how the perfect substitutability across the three variables in the HDI implies that a reduction in health could be counterbalanced in the index by an increase in material wealth. Thus, the rejection of hypothesis one is understandable, but using a different set of indicators, such as the multidimensional poverty index described by Alkire and Santos (2010), may yield different outcomes.

Moreover, although Raudsepp-Hearne and colleagues (2010) avoided the use of any indicators that include natural capital (to prevent a circular argument), the inclusive wealth indicator developed by Arrow and Dasgupta (2004) clearly shows that inclusive wealth (used as a proxy for well-being) has declined in most countries. This reduction can be traced back to the decline in ecosystem services. The Arrow-Dasgupta study showed significant changes in well-being across countries when compared with the HDI and the GNP per capita, with much of this difference attributable to the decline in natural capital.

Raudsepp-Hearne and colleagues also rejected the role of scale and aggregation in explaining the apparent paradox. The MA focused on global findings; however, are global estimates or averages of human well-being useful for policymaking? Human well-being as defined in the MA is context specific, and it therefore differs across countries. Attempting to aggregate across a common indicator actually contradicts the nature of the definition of human well-being adopted by the MA. It makes sense to measure well-being at a country level, but it would be even more useful for poverty-reduction policies if we could do so at smaller scales, such as municipality or community levels. For example, a study by the World Resources Institute on poverty mapping demonstrates that in Ecuador, initial national-level data did not show poverty in many parts of the country. However, when the indicator was used at the provincial scale, pockets of poverty began to emerge, and when the resolution was further refined to the municipal scale, large pockets of deprivation appeared.

The second hypothesis revolves around trade-offs among ecosystem services. The "Environmentalist's Paradox" authors concluded that there is sufficient evidence to demonstrate that trade-offs among ecosystem services (in their case, food production against some regulating services) can be a reason for the direct link between declining ecosystem services and well-being. Incidentally, food production and aquaculture were two of the eight ecosystem services shown by the MA to have increased over the past 50 years. The authors rightly say that the benefits of greater food production outweigh the costs from declines in regulating, supporting, and cultural services at the global level, but I would point out that the converse is true at smaller scales. Events after Hurricane Katrina in New Orleans and the recent floods in Pakistan support the idea that the link between ecosystem services and human well-being should occur at finer spatial scales, suggesting that using global statistics makes little sense.

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The authors of "Untangling the Environmentalist's Paradox" explored in their third hypothesis whether advances in technology have decoupled the link between ecosystem services and human well-being. Evidence provided by the authors suggests limited decoupling of the link. However, it might be worth further exploring the extent to which human well-being is dependent on ecosystem services. There is no doubt that many other factors contribute to well-being. Although the authors do attempt to address factors such as energy, minimal attention has been paid to other determinants of well-being, such as education, technological advances in health, and the time value of leisure.

Lastly, concerning Raudsepp-Hearne and colleagues' fourth hypothesis, have the gains in well-being over the past 50 years been achieved at the expense of future streams of ecosystem services? The nonlinearity of complex ecological systems makes it very difficult to forecast when thresholds will be reached and the consequences of reaching them. The authors acknowledge that the uncertainty of the duration and strength of time lags prevents them from drawing any strong conclusions as to whether society has been drawing on its savings to increase its present wealth. Yet these gains can be lost if the cash reserves (i.e., the ecosystem and its services) collapse and well-being crashes.

"The Environmentalist's Paradox" highlights key gaps in our present understanding of complex socioecological systems. The authors shed some light on the apparent paradox that emerges from the MA definition of ecosystem services and its key finding, but they are unable to give any conclusive explanation of why human well-being is increasing while ecosystem services are declining. The authors have spelled out a research strategy to gain a better understanding of the ecosystem services–human well-being nexus. All four areas—how provision of ecosystem services enhances multiple aspects of human well-being, ecosystem service synergies and trade-offs, technology for enhancing ecosystem services, and forecasting ecosystem services—have merit. However, I suggest below an additional research area for gaining a better understanding of human behavior.

One of the challenges for future research, as suggested by French President Nicolas Sarkozy's initiative "Beyond GDP," is the search for an evaluative space that includes a multidimensional notion of human well-being. This initiative would include constituents of well-being that are directly, indirectly, and not at all influenced by ecosystem services. It does seem that, in addition to further research to understand how ecosystem services in their entirety enhance multiple aspects of human well-being, we need more research on the key factors that influence human behavior and values across different ecosystem services as well as across the different constituents of well-being. For example, some cultures might place greater importance on social relations than on material wealth, attaching a higher value to sacred groves (a nonmonetary one) than to timber (a monetary one). The time for a millennium assessment of human behavior, an idea put forward by Stanford ecologist Paul Ehrlich, has come.

Conclusion

"Untangling the Environmentalist's Paradox" comes at an appropriate time, and asks a valid question: Why is human well-being increasing when ecosystem services are declining? Is there a fundamental flaw in the conceptual framework of ecosystem services, or is there a rational answer to the question? One key result that should follow from the analysis is the importance of scale. We must ask ourselves if global findings provide results capable of guiding policy toward addressing ecosystem services and declines in human well-being. Most of the changes in well-being, as repeatedly illustrated, occur at smaller spatial scales, yet the data Raudsepp-Hearne and colleagues used to explain the causes and effects emphasize findings at the global level. Perhaps a key finding from the "Environmentalist's Paradox" is that we must begin paying attention to the level at which analysis should be done, so as to get the best guidance possible for policymaking.

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