

The Index of Human Insecurity

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Introduction

Traditional perspectives on security have been conceived of primarily in terms of neutralizing military threats to the territorial integrity and political independence of the state. However, in recent years, there has been increased emphasis placed on expanding the traditional conception of security to include so-called non-conventional threats. These include: resource scarcity, rapid population growth, human rights abuses, outbreaks of infectious disease, environmental degradation caused by toxic contamination, ozone depletion, global warming, water pollution, soil degradation and the loss of biodiversity (*cf.* Ullman, 1983; Renner, 1989; Westing, 1989). It is now accepted that *environmental stress, often the result of global environmental change, coupled with increasingly vulnerable societies, may contribute to insecurity and even conflict.*

As our perspective on security changes, it is important to adapt our policy framework to meet this change. One alternative is to focus on *human security*, recognizing the inter-linkages of environment and society, and acknowledging that our perceptions of our environment and the way we interact with our environment are historically, socially, and politically constructed. In this context, human security is achieved when and where individuals and communities:

- have the options necessary to end, mitigate, or adapt to threats to their human, environmental, and social rights;
- have the capacity and freedom to exercise these options; and
- actively participate in attaining these options.

Moreover, attaining human security implies challenging the structures and processes that contribute to insecurities.

How, then, is environmental degradation related to human security? Three key features of the links between environment and security must be recognized.

- i) There exists a *cumulative causality* between environment and security (e.g., environmental degradation may result in population movement that in turn poses a threat to the environment).
- ii) The responses to the insecurities posed by environmental degradation may contribute to other insecurities (e.g., population movement could also threaten other aspects of human security not directly linked to the environment).

iii) Human security embodies the notion that problems must always be addressed from a broader perspective that encompasses both *poverty* and issues of *equity* (social, economic, environmental, or institutional) as it is these issues that often lead to insecurity and conflict.

One avenue for research on the links between environment and security is to identify indicators of various components of human security, including the environment. This could assist development planning. Accordingly, we developed the Index of Human Insecurity (IHI) as a mechanism to help identify vulnerable or insecure regions, and also to help inform policy and aid decision makers in development assistance efforts. We also thought that there was a need for computer-based information to assist with medium and long-term development planning efforts. For these reasons, the IHI could help provide a better understanding of the forces that lead to human insecurity and highlight where the most insecure regions may be now and in the future. Last, the IHI considers what the potential impact of global change may be on human insecurity. This includes, for example, the effects of population growth and distribution, and atmospheric change.

Construction of the Index of Human Insecurity

The Index of Human Insecurity is essentially a classification system that distinguishes countries based on how vulnerable or insecure they are, and groups together those countries that possess similar levels of insecurity. We developed the framework for the selection of indicators for the IHI from our previous work on indicators of sustainable development, although parallels and congruencies with theoretical developments in other indicator research fields, such as human well-being and social indicators, are also evident. Indicator selection followed a set of evaluation criteria that included:

- relevance to the selection framework in that the indicator measures either key structural relationships (i.e., linkages and defining characteristics) or key functional relationships (i.e., process flows) of the system with reference to either environmental, economic, societal, or institutional components (Table 1);

Table 1.

Selected indicators of human insecurity comprising the standard set

Environment	<ul style="list-style-type: none">• net energy imports (<i>% of commercial energy use</i>)• soil degradation (<i>tonnes/yr.</i>)• safe water (<i>% of population with access</i>)• arable land (<i>hectares per person</i>)
Economy	<ul style="list-style-type: none">• real GDP per capita (<i>US\$</i>)• GNP per capita growth (<i>annual %</i>)• adult illiteracy rate (<i>% of population 15+</i>)• value of imports and exports of goods and services (<i>% of GDP</i>)
Society	<ul style="list-style-type: none">• urban population growth (<i>annual %</i>)• young male population (<i>% aged 0-14 of total population</i>)• maternal mortality ratio (<i>per 100,000 live births</i>)• life expectancy (<i>yrs.</i>)
Institutions	<ul style="list-style-type: none">• public expenditures on defence versus education, primary and secondary (<i>% of GDP</i>)• gross domestic fixed investment (<i>% of GDP</i>)• degree of democratisation (<i>on a scale of 1 - 7</i>)• human freedoms index (<i>on a scale of 0 - 40</i>)

- existence of a theoretical or empirical link between the indicator and insecurity (see below);
- general availability of the data;
- consistency of the data with other selected indicators to allow for future modeling of the system; and
- adequacy of the spatial coverage based on the number of countries represented and adequacy of the time series available.

The indicators selected to comprise the standard index are shown in Table 1. Human security, by almost any definition, is a function of a complex set of characteristics and processes? social, political, environmental, and institutional. All of these components are necessary for security and for sustainability. Using the above evaluation criteria, we decided to initially select four indicators corresponding to each of the four categories, thus yielding a standard set of 16 indicators. Changes in the levels of the individual indicators reflect potential changes in the levels of human insecurity.

A complete discussion of the calculation of the IHI and the various statistical procedures used are found in Lonergan et al. (forthcoming). In summary, the following steps were used to calculate the IHI.

1. *A complete time series for all indicators and all countries was established.* Data were collected, where available, for the years 1970 through 1995. As most countries did not have complete time series for most indicators, it was desirable to estimate missing time series data through some relatively simple statistical techniques (linear regression or data interpolation) where the existing data was sufficient;

2. *The data were standardized.* Indicators were adjusted such that they use the same unitless scale and possess the same range of possible values such that all indicators are given the same weight in the composite index; and,

3. *The data were classified and the index calculated.* Data for each indicator were classified for each year into 10 categories by cluster analysis. Countries were assigned a number between one and ten for each indicator in which they had a known or estimated value. The corresponding IHI value was then calculated for each country in each year as the average category value for all indicators.

Figure 1 shows the results for 1995 for the world. As might be expected, countries with the highest index values (corresponding to the highest levels of insecurity by our measure) are those in West and Central Africa, and the Horn of Africa (with a few isolated others, such as Afghanistan and Cambodia). There is a concern, however, that viewing the index on a global scale will tend to mask regional insecurities, whether in Eastern Europe, Central America, or elsewhere. Some countries have such high (or low) values of human insecurity that they minimize differences within regions. For this reason, we undertook separate analyses for specific regions – Africa, Central and South America, South and Southeast Asia, and Eastern Europe and Russia. In these cases, the index was recalculated for each region (and hence there is not direct compatibility with Figure 1). Figure 2 shows the results for Central and South America, where Haiti and Guatemala exhibit the highest levels of insecurity.

Figure 1.

Index of Human Insecurity (IHI) values for 1995.

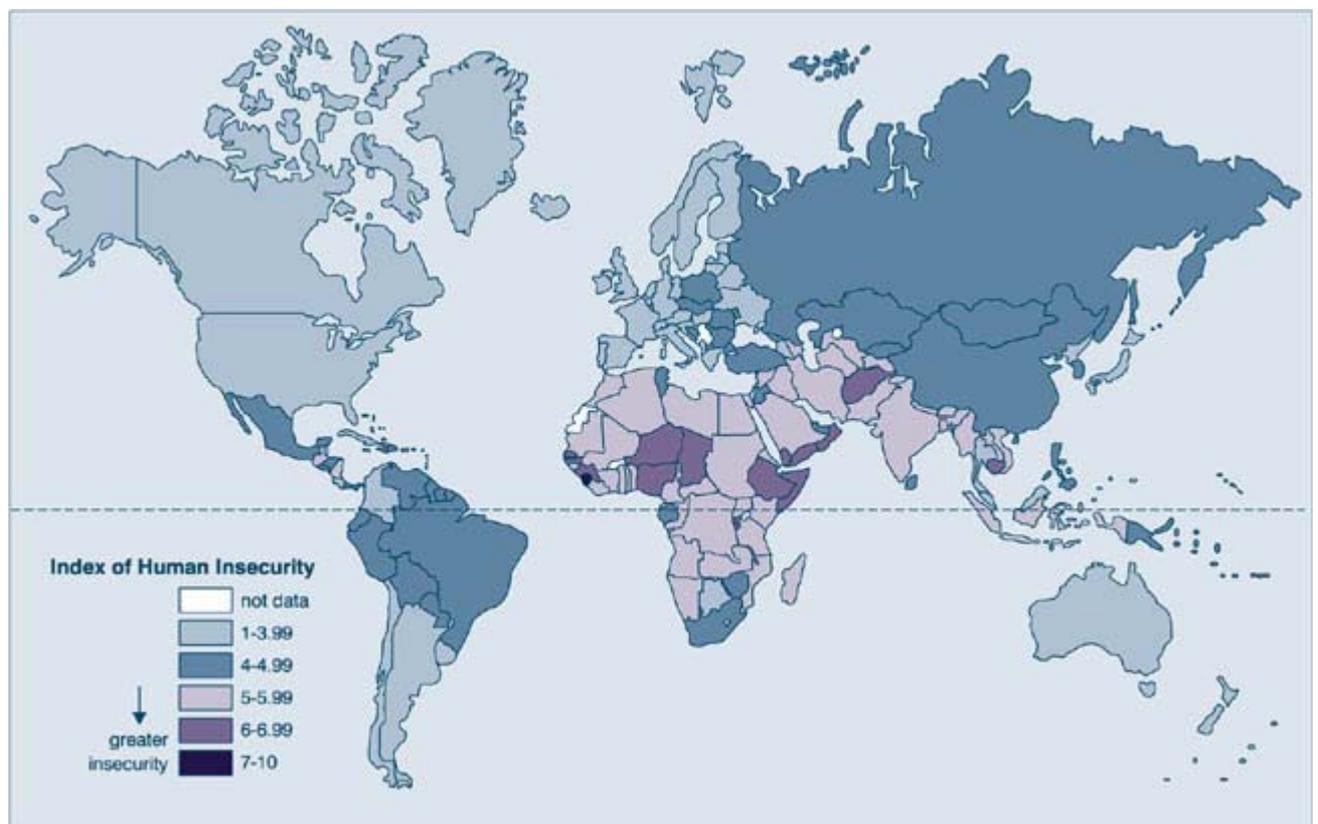
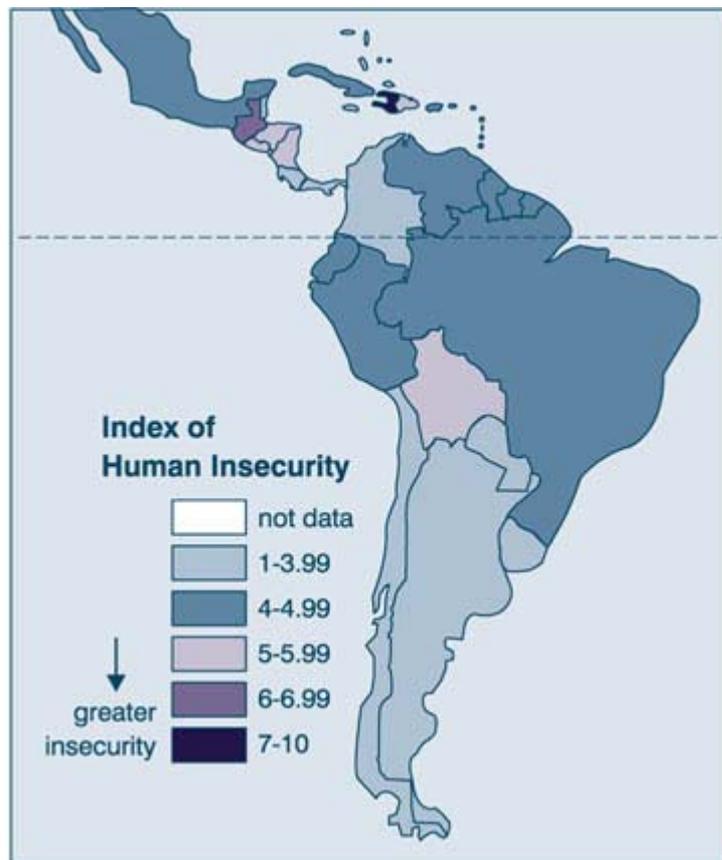


Figure 2.

Index of Human Insecurity (IHI) values for 1995, considering only Central and South America.



Key Issues

It is important to acknowledge that the set of indicators used in the IHI defines *de facto* what we mean by human security. Therefore, the 16 indicators, equally weighted, present a one-to-one mapping of human insecurity. Although the measurement of terms such as human security, sustainability, and peace is not essential, it does provide a forum for discussing the types of policies that need to be implemented to meet these somewhat ambiguous objectives. The result is a trade-off between using large collections of variables as indicators which is undesirable due to information redundancies and difficulties in the interpretation of the results; (Gustavson et al., 1999), and a very small set of indicators that may not be sufficient to capture the complexity and richness of the term or concept. One goal of arriving at the final set of standard indicators for the IHI was to achieve a *parsimonious* set. We also felt it was important to establish a base set of indicators that reflect, as much as possible, the empirical work on vulnerability, conflict, and human security. This base set can then be used as a basis for further discussion and experimentation.

Another key issue should be noted at this point. The standard IHI classification system described here only compares relative levels of insecurity between countries for any given year. Using this procedure, it is not possible to ascertain whether changes in the IHI over time for a given country are a result of changes *within* that country or the results of *relative* changes arising from changing conditions in other

countries. One extension to our work involves using alternative statistical procedures to determine whether the level of insecurity within a country changes over time (or whether the change is a relative one). It is still important to note that the IHI provides a comparatively simple and inexpensive 'first cut' to identify where human insecurity is the greatest and suggests some of the reasons behind the high levels of insecurity. It is also a useful pedagogical tool to provide information on changes in levels of human insecurity over time.

Last, there are indicators, or data, that most analysts feel should be part of an index of human insecurity, but for various reasons they cannot be included. These include vulnerability to natural hazards and income distribution. Global data (by country) are lacking for both of these possible indicators and, as a result, they were not included in the base set. However, some data do exist for annual mortality due to natural hazards and for income distribution (defined as the lowest income quintile's share of 20% of the total income). We extended the analysis by incorporating these data into the index, and then analyzed what effect this had on the level of human insecurity for each country. The additional data results in an increase in the level of insecurity of a number of African countries. However, it is difficult to say whether these changes have to do with a better assessment of insecurity or to data inadequacies.

The Use of the IHI as a Predictive and Evaluative Tool

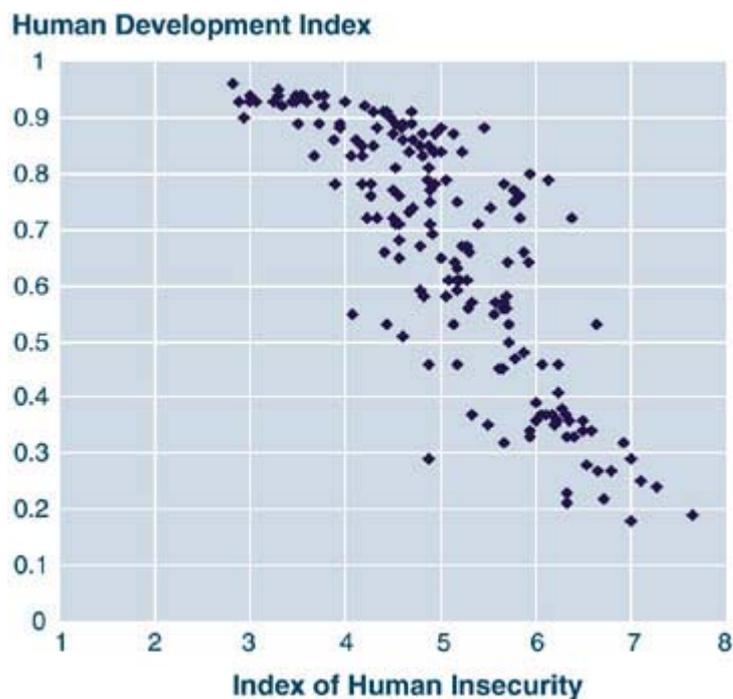
We can project changes in the level of any given indicator and re-calculate the index for any given year in the future. More importantly, we can also incorporate population projections, climate change projections, and other modeling efforts (e.g., changes in per capita levels of consumption) into the analysis and use the results for predictive purposes. If levels of human insecurity change over time for a country, relative to other countries, it will provide some indication of countries that should be observed more closely. Although we would hesitate to put the IHI in the category of an 'early warning system' the model can provide an indication of changes in insecurity over medium- and long-term horizons.

Implicit in the process of developing an index of human insecurity is the notion that the level of development – economic, social, and political – is closely related to the level of human security. This leads us to ask two questions. First, how does the IHI relate to indicators of human development such as the Human Development Index (HDI) of the United Nations Development Programme (UNDP, 1997), and second, can the IHI be used as a guide for development assistance agencies?

Figure 3 depicts the relationship between the IHI and the HDI for 1994. The HDI is a simple index comprised of three indicators: level of economic development (GDP per capita), longevity (life expectancy), and level of education (literacy rates). A simple correlation analysis indicates that there is a strong relationship between the HDI and the IHI ($r = -0.829$, $n = 174$, $p < 0.001$). Visually, however, Figure 3 suggests that there *may* be a sigmoidal (s-shaped) relationship between the two indices. This implies that significant increases in human security may occur with only small increases in development (as defined by the HDI). Therefore, when looking for indicators of sustainability or quality of life in countries at the low end of the development scale, a measure like the IHI may be much more meaningful.

Figure 3.

Relationship between the Index of Human Insecurity (IHI) and the Human Development Index (HDI) by country for 1994.



The strong correlation between the IHI and the HDI is not surprising, given that some of the variability in the standard set of indicators used in the IHI was due to variation in similar indicators in the HDI (see Lonergan et al., forthcoming). However, the correlation is not perfect, for much variation in the relationship is still unexplained. Why use the IHI instead of the HDI? First, one of the stated goals of the HDI is to achieve a stable indicator; therefore, the HDI may mask much of the variability in human security that can be identified by the IHI. Second, the IHI has a much stronger theoretical base to both human security and development than the HDI. And last, by using some qualitative data, the IHI tries to address the issue of perception more than the HDI and other indicators of development. This is not to say that the IHI does not need much refinement, only that it is a richer and more interesting indicator than the HDI, particularly at the lower end of the development scale.

Policy Implications and Future Applications

Like any index system, the IHI provides an "indication" of levels of human insecurity, and how these levels may change over time. There are interesting questions that can be explored regarding data quality and reliability, the definition of human security, and the numbers and types of indicators used. However, for policy purposes there are two relevant applications.

1. The IHI can be linked to more specific sets of indicators (e.g., water security or food security) to assist in identifying how sector-specific problems may affect overall levels of human insecurity. For example, countries experiencing conditions of water scarcity may be particularly vulnerable if they also exhibit high levels of human insecurity. Thus, they may be less able to adapt to droughts or disruptions in water supply.

2. The IHI can be used to project how human insecurity may change over time. As the index changes (particularly if insecurity increases), it acts as a type of 'early warning system' if we interpret 'early' as five to ten years rather than a few months for development assistance agencies. Again, the global index can then be linked to systems of sector-specific indicators and to information from the field to provide a complete picture of potential problems.

There are a number of extensions that could be undertaken with respect to the IHI. Likely the most important of these is to consider whether there are threshold levels for certain indicators that is, a level below (or above) which an individual or community is, or feels, insecure. In some cases, a very high level of insecurity for a single indicator no matter how low, or secure, a region is relative to other indicators may be enough to dominate all other considerations. Associated with the need to consider thresholds is the absolute necessity of incorporating the perspectives of those most insecure into the index. What is insecurity to those in Rwanda or Mali? What is *their* appropriate measure of development? Already mentioned is the need to project changes in the index over time through modeling. Is it conceivable to incorporate climate warming and changes in per capita levels of consumption into the analysis? We think this is one of the strengths of the IHI. Last, the importance of obtaining feedback from policy-makers and potential users of the index is considered vital to its continued development. Although this document will provide initial information on the index to a variety of individuals, there is a need to publish a detailed set of maps, projections, and data tables for use by students, researchers, and policy-makers.

The work on the Index of Human Insecurity demonstrates that there is considerable potential for such an index when used in the context of measuring sustainability, development, and human security. As international agreements such as the UN Framework Convention on Climate Change incorporate the goals of sustainable development and human security as key provisions, there will be a need for additional research on indicators for measurement and prediction. The IHI presents a major effort towards meeting this need.

Literature Cited

Lonergan, S.C., K.R. Gustavson, and B. Carter, forthcoming. *Developing an index of human insecurity*. Global Environmental Change and Human Security Project, Research Report, University of Victoria, Victoria, BC.

Gustavson, K., S.C. Lonergan, and J. Ruitenbeek, 1999. Modelling indicators of sustainability for the Fraser River Basin. *Ecological Economics*, 18(4): 116-132.

Renner, M., 1989. *National security: the economic and environmental dimensions*. Worldwatch Paper 89. Washington, DC: Worldwatch Institute.

Ullman, R.H., 1983. Redefining security. *International Security* 8(1): 129 - 153.

United Nations Development Programme (UNDP), 1997. *Human Development Report 1997*. New York: United Nations Development Programme.

Westing, A.H., 1989. The environmental component of comprehensive security. *Bulletin of Peace Proposals* 20(2): 129 - 134.

Key Readings:

Moldan, B. and S. Billharz (eds.), 1997. *Sustainability Indicators: Report of the Project on Indicators of Sustainable Development*. New York: John Wiley and Sons.

United Nations Development Programme (UNDP), 1998. *Human Development Report 1998*. New York: United Nations Development Programme.

United Nations, 1996. *Indicators of Sustainable Development: Framework and Methodologies*. New York: UN.

Key Web Sites:

The UNDP site on Human Development Indicators:

<http://www.undp.org/hdro/indicators.html>

The International Institute of Sustainable Development in Winnipeg, Manitoba. This site has a strong emphasis on indicators (including a discussion group site):

<http://www.lisd.ca/>

<http://www.lisd.ca/linkages/sd/scipol/>

The World Bank page on data and indicators:

<http://www.worldbank.org/data/>

Source: <http://www.gechs.org/aviso/06/index.html>

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