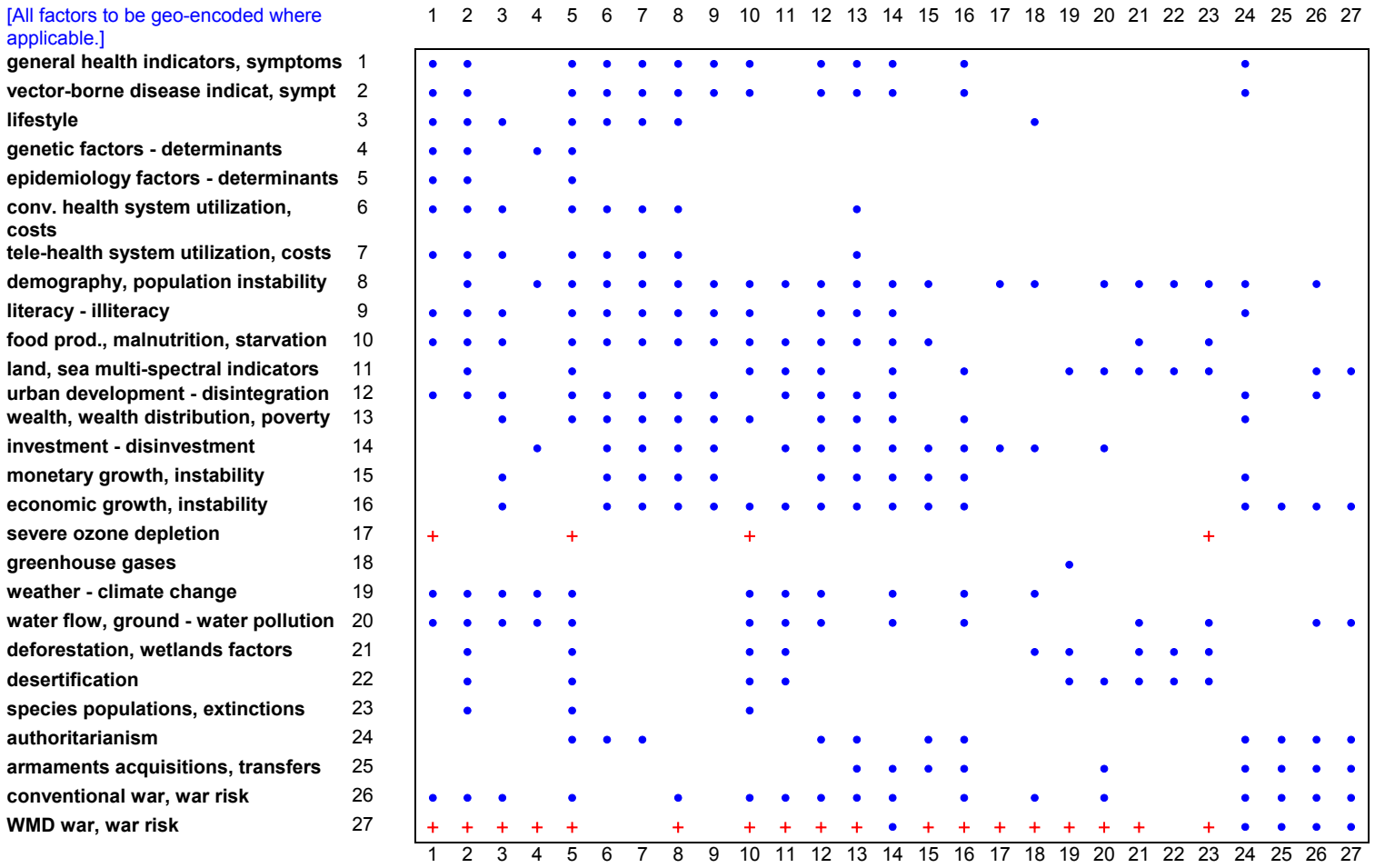
PROBLEMS ARE CONNECTED!

Possible Couplings Among Variable and Problem Groups



The above table illustrates the idea of couplings:

1) It shows how diverse is collection of problem groups / factor groups that must be considered to effectively do global modeling and understand global change.

2) It speculates (in a reasonable way) how these problem and factor groups might be connected.

A given column number denotes entry of same row number. For example, row 8 is marked for a set of factors labeled “demography, population instability; column 8 represents that same group of factors.

The meaning of this arrangement is the following:

In this figure, cell entries represent hypothetical couplings **from** row entry **to** column entry. For example, the blue dot in the cell with row number 8 and column number 2 means that “demography, population instability” (row 8) is considered to affect “general health indicators, symptoms” (column 2).

The symbol • supposes a strong coupling at present;

The symbol + supposes a contingent strong coupling—actual coupling only following occurrence of some named event that does not normally happen (and, given the examples shown, we hope never happens!).

Note, as shown in the top left of the figure, that “All factors to be geo-encoded where applicable.” This means that, in the complete execution the Global Vision modeling concept, a Geographic Information System will be used to code information that is specific to some geographical location. For example, information on named cities would include their geographic coordinates.

This figure shows possible, not necessarily realistic couplings—to realistically estimate actual couplings is a significant part of the modeling work that remains to be done.

Also, the figure is schematic because it shows problems and groups of variables. Each of the row and column entries symbolizes a bundle of many actual variables. For examples, click here.
[06_specific-data-types.doc]

Further discussion of couplings

Improved forecasting requires the recognition that societal and environmental issues are *not* disjointed; they are an *interconnected complex* of challenges, questions, problems, and pertinent background phenomena; that is, the factors are *coupled*, one to another.

Let us focus for the moment on issues that are perceived as “problems”. Click here to see the previous list again. **[01_global-probs.doc]** The prevailing practice in analysis and policy making has been to consider such problems on an individual basis. Though there have also been exhortations to address the "*global problematique*" and to practice "*holistic thinking*", the modern scientific mentality implies that neither piecemeal thinking nor mere rhetoric about "integrated problems" are viable approaches to global problems. For effective forecasting, it is essential to take account of the above italicized phrases at an operational level. Every problem and condition is vitally affected by one or more of the others; in fact, it is plausible that each of the 18 problem areas listed affects, and is affected by, directly or indirectly, every other area on the list.

Turning back to either of the two couplings matrices linked above, the connections between problems, or "couplings", are *speculatively* illustrated in the linked figure. The problems are listed twice, as "antecedents" tagging the rows of the table and as "consequences" tagging the columns. For example, *ozone depletion* as antecedent has *species extinction* as a consequence (since many living things may not be able to survive increased ultraviolet light). This is a "first order" consequence; that is, ozone depletion and species extinction are coupled. Now take species extinction as an antecedent and move across its row to find *malnutrition/starvation* as a consequence. This is a first order consequence of species extinction, but also a "second order," that is an indirect, consequence of ozone depletion; ozone depletion and malnutrition/starvation are indirectly coupled. Taking malnutrition/starvation as antecedent, likewise find a third order consequence of ozone depletion (which is also a second order consequence of species extinction); and so on for 4th, 5th, ... nth order consequences of ozone depletion.

Now you can see how all the problems are connected. Since every row is filled with one or more X's, every problem has consequences; since every column is filled, every problem has antecedents. This shows that the process of tracing 1st, 2nd, and higher order consequences can go on forever; *every problem is part of an infinite string of causes and effects involving the other problems*. Thus one cannot solve them one at a time; one can only solve them together, so we must consider them together.

Here we come to another difficulty in answering pressing societal-environmental issues: there is little agreement as to which problems are coupled and how, or to which other kinds of information the problems are connected. This means that it is not yet possible to come to a consensus about what interventions are available, for controlling global change or about which of them to use to make things better; or concerning any of the more specialized concerns of a particular individual or group. For intervention involves a coupling between something that we can control, as antecedent, and something we want to change, as a consequence. So we would need to agree first on what the coupling is, and since every problem is really part of a long string of problems, also we would need to agree on what the long string of consequences are in order to agree on the realistic implications of a proposed action. Then, there is the further complication arising from limits imposed, by chaos and imperfect information, on how far into the future one can feasibly project the affects of connections involving multiple couplings.

A further point the reader can draw from the above discussion: the Global Vision program is very aware of issues that arise from the deep complexity of the global system. The idea is not to disregard such complexity but to address it with the best that the diversity of modeling approaches and modern scientific mentality have to offer.