GIS AND MODELS FOR ENVIRONMENTAL HEALTH

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Abstract: GIS and modeling clearly have the potential to make an important contribution to national environmental health action plans development and implementation: indeed, in view of the general scarcity of environmental and health data, some form of modeling is likely to be a prerequisite. Even in the absence of a full understanding of the processes and relationships involved, or of adequate data, the construction of flow diagrams and mind maps can help to develop an appreciation of the issues and help to build consensus amongst the various stakeholders. This paper examines some of the issues involved in using GIS and models as part of the national environmental health action plan, and illustrates their use with examples from Ukraine.

Keywords: GIS, models, mapping, spatial interpolation, national environmental health action plans, decision making

1. Introduction

The development of National Environmental Health Action Plans (NEAPs) has become a real international movement in recent years. In response to the Helsinki Declaration, many countries have begun to establish NEAP. The main purpose of NEAP is to set priorities and address the specific issues faced by the country.¹

The need to identify and prioritize issues in a rationale and transparent manner creates the need for agreed methods of risk assessment, in particular GIS and modes.²

GIS and models may be defined as systems for the manipulation and presentation of data. As such, they are able to perform a range of functions, including data capture, data cleaning, data integration, data storage, data search and retrieval, spatial analysis, statistical analysis and data display.³
They are valuable tools for NEHAP development and implementation. They provide a means of:

- Bringing together the information needed as part of the NEHAP process in a consistent form; visualizing the information in the form of maps
- Deriving statistical and other information from the data; interpreting spatial pattern of environment and health; combining information on environmental conditions and population for health risk assessment
- Monitoring change in environmental and health conditions, as a basis for evaluating the effectiveness of NEHAP

This paper examines some of the issues involved in using GIS and models as part of the NEHAP process, and illustrates their use with examples from Ukraine. The GIS is built upon a number of basic geographic and statistical datasets. Although it is not yet complete, the GIS are already being used. The examples presented here illustrate some of their applications, but also show some of the dangers and problems in using GIS and models.

2. GIS Functionality

2.1. MAPPING AND VISUALIZATION

One of the most important potential contributions of GIS in relation to NEAP is clearly as a means of display and visualization. The importance of maps in this respect should not be underestimated: they are extremely persuasive and informative tools. They provide a means of bringing together a large volume of data and synthesizing it within a relatively simple and often readily accessible form. They can add value to the data by helping to show spatial patterns and relationships. In some cases, they may also contribute to tests of such relationships, by providing a first-step opportunity to examine possible spatial correlations.

Good maps also carry a clear and often powerful message, which is interpretable by nonspecialists, and they help to place this message in context by allowing comparisons between different areas and across space. They are consequently vital tools for risk communication.

The use of maps to inform discussion of and debate on NEAP nevertheless needs to be viewed with caution. The very power of maps means that they must be carefully designed. The choice of class interval, symbolization, colour scheme, map projection and scale all have enormous impact on the message, which the map conveys. Unfortunately for the map maker also, many of the environmental conditions of interest are not distributed in equal or convenient-