Geog 461 Learning Objective Outline

LOO 22 Linked Analysis for Programming-Level and Project-Level Decision Situations

22.1 What role does GIS-based modeling play in linking programming to implementation?
Nyerges and Jankowski *GISDS* Chapter 9. Linking Analyses Across Decision Situation Processes
Section 9.2 Linked Analysis for Programming-level and Implementation-level Situations

Let's compare the efforts in modeling across all three situations.
Table 9.1 Framework for how much time can we spend at "coming to know"
in planning, programming and implementation level work using GIS?

Assume you have "six units of effort" to expend in a work effort. How would you distribute the units across each of the decision situations to come to know about what do to in that decision situation? Each entry in a cell is the number of units to be practically adequate at that stage, given the context of the work situation. The "effort budget" of six units is never enough – but that is the way it always seems to be. "If we only had twice the time, we would be able to do twice as good a job and deliver a product that is twice as concise." (Gerald VanBelle, UW Environmental Health)

In light of the previous section, improvement programming analysis is about selecting projects to be budgeted in the current round of consideration based on existing conditions. As mentioned earlier, a major component is on budgeting, but other criteria are considered as well, particularly in regards to a projects "impact" on the world.

The **link between programming-focused work and project implementation-focused work** might best be **understood in terms of the "impact model" phase of modeling**, but remember the link between decision situation work really comes through all phases. However, to be practical let us focus on the impact modeling. What impacts might we consider – see Table 9.2 and 9.3 in text.

See Table 9.2 in Nyerges and Jankowski *GISDS* Chapter 9 shows **social impacts** that might be considered in a project-level impact assessment for an integrated watershed management.
See Table 9.3 in Nyerges and Jankowski *GISDS* Chapter 9 shows an elaborate set of characteristics, conditions, and factors for **environmental impact assessment** associated with habitat restoration. The number of criteria used depend on the nature of the assessment to be performed.

22.2 What workflow process is needed to address impacts in detail?
Nyerges and Jankowski *GISDS* Chapter 9. Linking Analyses Across Decision Situation Processes
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A few key types of Environmental Assessment that we can use to provide an understanding of the difference between a program-level assessment and a project implementation-level assessment; Sadler (1996) identifies, and Heathcote (1998, p. 331) summarizes four key types of environmental assessment, although given the wording we should generalize this to simply "assessment":

1. Strategic environmental assessment (SEA) – process of prior examination and appraisal of policies, plans, and programs and other higher-level or pre-project initiatives.

2. Environmental assessment (EA) – systematic process of evaluating and documenting information on the potential, capacities, and functions of natural systems and resources in order

to facilitate sustainable development planning and decision making in general, and to *anticipate and manage the adverse effects and consequences of proposed undertakings in particular.*

3. Environmental impact assessment (EIA) – a process of identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of proposed projects and physical activities prior to major decisions and commitments being made

4. Social impact assessment (SIA) – process of estimating the social consequences that are likely to follow from specific key policy and government proposals, particularly in the context of national EA requirements.

The above four types of assessment are in some sense a matter of "workflow details" – which is how we differentiate the programming-level assessment from the project implementation-level assessment.

Within the context of Heathcote's (1998) discussion of integrated watershed management, environmental assessment often includes three phases, preliminary (simple) assessment, detailed assessment, and follow-up (**See Figure 9.2**). Preliminary assessment is used to determine whether a project is covered by EA legislation or policy, whether an EIS is required, the necessary nature and extent of the EA process, and scoping. Detailed assessment includes analysis of impacts and mitigation necessary for the "do nothing" option. Follow-up includes monitoring and audit functions to determine the actual impacts of the project and ensure that mitigation measures are in place.

Figure 9.2 Typical Environmental Assessment Process (adapted from Heathcote 1998 Figure 10.1)

We can further characterize the difference in a programming-level and implementation-level assessments using the Steinitz 6 phases of modeling in Table 9.1. A programming-level analysis performs a simple assessment. A simple assessment would focus on phases 1, 3, 4, and 6 of Steinitz et al. (2003) phases of modeling (values describe options and evaluate options that feed the decision model in phase 6). The detailed assessment incorporates 2 (nuanced process) and 5 (impacts).

Legally speaking, according to state and federal law, an EIS is performed only when 1) state money or federal money, respectively, is involved, and 2) a full EA is determined to be necessary because the impacts that have been identified are "significant". When a simple EA is performed the phrase "**determination of non-significance**" is used to describe the resultant nature of impacts.

The full impact assessment – **an EIS** - of the natural and/or human activities on the environment requires an extensive knowledge of direct or indirect effects from different factors, and possible consequences. Using detailed GIS information for project implementation (scope, design and build) is still somewhat of a technical challenge even in 2008, because of the lack of knowledgeable people to put GIS to use in more sophisticated ways.