

Important Features of Sustainable Aggregates Resource Management



by Slavko V. Šolar, Geological Survey of Slovenia



Deborah J. Shields, USDA Forest Service Rocky Mountain Research Station



William H. Langer, U.S. Geological Survey



The overarching goals of sustainability are economic prosperity, environmental health and social equity. Sustainability is sometimes controversial. This happens because sustainability is not science *per se*, although it uses science to achieve societal goals. Rather, it is a value statement and human values are independent of social, economic and ecological context.

Thus, sustainability is about choices regarding what to sustain, how, when, where and for whom. The debate about sustainability reflects differences of opinion about the appropriate answers to these questions. Differences in values also are reflected in the many definitions of sustainable development (Shields, 2004). The Mining Minerals and Sustainable Development project inventoried more than 350 definitions during the course of their work (IIED, 2002).

Sustainable Development and Minerals

Mineral resources are not renewable; sustaining a producing deposit or mine is not possible. This does not mean that the principles of sustainability are irrelevant in the case of mining. Sustainable development involves managing resources in a way that is conducive to long term wealth creation, and minerals are a form of endowed wealth. Moreover, mineral resources are integral components of economic and social systems; their use is fundamental to satisfying human needs and wants.

Aggregates Specifics

Sustainable aggregates resource management (SARM) is an approach that supports development of policies that reflect good science, public preferences and financial and social constraints. Such management should be supported by complete information to ensure that all stakeholders' objectives are at least acknowledged and, if possible, addressed.

Sustainable Aggregates Resource Management Framework

A SARM plan can be organized according to the three main dimensions of sustainability: environmental, economic and social.

Environmental aspects

SARM requires developing aggregates resources in an environmentally responsible manner that does not result in long-term environmental harm, even if short-term environmental impacts are unavoidable. Two main environmental categories should be considered in SARM: reducing negative environmental impacts and resource protection. These goals are very achievable because the aggregates industry has made and continues to make great strides in environmental management.

Reclaiming aggregates operations or orphaned sites has tremendous potential to improve our quality of life, create additional wealth, increase biodiversity and restore the environment. In the expanding suburban areas of today,

mined-out aggregates pits and quarries are converted into second uses that range from home sites to wildlife refuges, from golf courses to watercourses and from botanical gardens to natural wetlands. Reclamation should be a major consideration in sustaining the environment and in creating biodiversity (*Langer, 2003a*).

Mineral resource (aggregates) protection includes: minimal exploitation of primary aggregates with rational production by introducing the recycling and reuse of construction materials as aggregates; exploitation of renewable aggregates and substitute resources; increasing the knowledge about aggregates potential; and preserving the land access to aggregates in designated areas. The first two of these protection measures are intended to reduce the demand for aggregates that is newly mined or from newly developed sites. The latter two address the long-term need for primary materials (*Šolar 2003*).

Economic aspects

There are four main economic aspects to SARM: maintaining a viable

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business environment; encouraging value-added production and employment; embracing full cost accounting while remaining competitive; and providing for the material requirements of society. The first two of these are the responsibility of government. The third is the responsibility of the producer. And the fourth is a shared responsibility of government and the producer.

Economic realities drive industry activity. Producers need to remain competitive if they are to stay in business. Nonetheless, firms have a responsibility to accept the full cost of doing business, including costs of preventing or remediating environmental damage. Firms can increase competitiveness by modifying production processes, upgrading product quality and maintaining a well-trained workforce. Special attention with regard to human resources should be put on health and safety of employees.

Social aspects

Identifying stakeholders' values, interests, goals and the scale at which

they apply is the first step in resolving the complex situations that affect a country's ability to maintain a secure material supply and achieve other policy goals. As an example, there may be abundant sites in a region that have suitable aggregates, but the existence of conflicting land uses, zoning, regulations or citizen opposition can lead to insufficient or more costly supply. An important issue is fairness to those living near or impacted by aggregates extraction.

Equity implies a need for transparency and public participation in decision-making, as well as access to information within a democratic process (Šolar, 2003). All stakeholders should have access because increased awareness of the costs and benefits of supplying materials to society will lead to more timely agreements about how to (re)distribute costs and benefits of aggregates extraction and use (Šolar, 2003). We can conclude that social aspects facilitate the implementation of sustainability-based resource management.

Making SARM a Reality

To ensure that aggregates resources are managed in a sustainable manner, each of the primary stakeholders – government, industry, public and other non-governmental organizations – must accept certain responsibilities. The government is responsible for developing the policies and climate that provide conditions for success. The industry must work to be recognized as a responsible corporate and environmental member of the community. The public and non-governmental organizations have the responsibility to become informed about natural resource management issues, take personal responsibility for their consumption patterns and constructively contribute to a process that addresses not only their own, but a range of objectives and interests. All stakeholders have the responsibility to identify and resolve legitimate concerns and the government, industry and the public must cooperate at the regional and local levels in planning for sustainable aggregates extraction (Langer, 2003).

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To be effective, SARM must be a pragmatic pursuit, not an ideological exercise. It is an iterative process and government, citizens and industry should all be involved in the pursuit. The process consists of a number of steps, including issuance of policy statements, elaboration of objectives, establishment of actions, identification of indicators and monitoring (Langer, 2003c).

Policy statements issued by governments commonly identify the aggregates industry as a key industry contributing to jobs, wealth and a high quality of life for its citizens and commit the government to the protection of critical resources and protection of citizens from the unwanted impacts from aggregates extraction. Industry policy statements commonly identify environmental and societal concerns and commit the company to environmental stewardship and interaction with the community.

Objectives describe what is to be accomplished and commonly are subsets of the social, economic and environmental components of SARM. Typically, objectives will include, but not be limited to ensuring future supplies of aggregates, reducing the demand for newly mined aggregates, and protecting and restoring the environment (Langer, 2003b).

Actions are associated with each objective and describe the steps to reach the objective.

Indicators measure progress as well as the effects of efforts to protect and enhance natural and human systems.

Monitoring, feedback and the regular reconsideration of requirements as events develop all help to refine the SARM process. The establishment of a joint monitoring process presents an excellent opportunity to forge partnerships with communities and involve citizen groups.

Progress toward the policy goals that have been described in detail within a resource management plan need to be measured over time. There are three basic functions of indicators: simplification, quantification and communication.

Indicators for aggregates should support public awareness of issues related to sustainable resource management of aggregates and facilitate explicit consideration of the full range of costs and benefits of mineral development of aggregates.

SARM should be seen as an adaptive process that responds to changes in social, economic and environmental system and to changing public preferences as well.

Like mineral resource management policy, aggregates resource management also has many aspects. These can be grouped as natural settings (amount of natural resources, impacts on the environment); the economy (market conditions, technological level); the social dimension (acceptance of mining, local culture); and administrative organizational (political system, regional, state and local borders). The type of input scientists provide will depend on where a society is in this policy cycle, which aspects are under consideration and the decision context. Experts can provide input during the process of policy development. The consensus building process necessary to the achievement of a relevant and widely accepted mineral policy will depend in part on information about the impacts and consequences of choosing one policy option over another. For example, decision makers will need information about the depletion of mineral resources and the social and environmental effects of mining.

Sustainable aggregates resource management is about what to do (content) and how to do it (process). It occurs at the intersection of the public's values and objectives, science and information and government policy. SARM provides a framework for developing resource management policies through a fair, democratic and transparent process. It requires that mining be conducted in a publicly acceptable manner and brings together in a comprehensive manner different economic, technological, social and environmental disciplines. SARM puts the stress on materials supply and balancing benefits and costs of aggregates supply.

Implementing SARM requires challenging the myths about the aggregates

industry. Aggregates companies are not solely wealth generators, but most are responsible, responsive organizations that are aware of the role they play in society; they are organizations that have moved into the 21st century in terms of technology and values.

Venturing into the SARM arena is not without risk. Skeptics and others with hidden agendas debunk it. Reporting on SARM achievements creates an expectation from stakeholders – continuous improvement. However, the benefits can be great – enhanced stewardship of public resources, an improved business climate and progress toward a sustainable future. ■

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