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SUSTAINABLE PROGRESS AND IMPORTANT ENVIRONMENTAL FIELDS OF WATERSHEDS

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ABSTRACT

Watersheds are outstanding geographical field examples. They also operate under human influences based on cultures, values, economics, and politics, which exist at the interface between hydrosphere, atmosphere, lithosphere, and biosphere. This article is about teaching potential educators about watersheds ' geographical importance in relation to sustainable water resources. The IDEAS project involves developing teacher-training modules on sustainability of water resources that feature and stress multinational-multicultural understanding. Geography offers an outstanding collection of views, expertise and abilities to build a watershed understanding as significant environmental / geographic areas and as complex systems involving interactions between natural procedures and human activities. Pre-school geography curricula in the U.S. presently devote only small attention to problems of sustainability. Nevertheless, many U.S. geography curricula States continue to be influenced by the content of the National Geography Standards, Geography for Life (GESP, 1994), which offers many opportunities for the inclusion of both physical and human sustainability factors and issues. It is a sensible approach to introduce sustainability into geography training to illustrate a direct set of connections between sustainability problems and national standards.

Keywords: *Sustainable Progress, Watersheds, Water Resources, Teacher Education, National Geography Standards, etc.*

1. INTRODUCTION

Together with the Georg Eckert Institute, the IDEAS working group (Boehn & Henry, 2006) chosen "Water" as its focus among the subjects UNESCO (2006) quoted as vital to

sustainable progress. This IDEAS project includes developing teacher training modules based on geography to incorporate and highlight multinational / multicultural views on water resource sustainability. Education was observed as a main factor in encouraging adequate management of the watershed (Natural Resources Law Center, 1995). Effective watershed stewardship is key to freshwater resource sustainability. The strategy for these modules is to collect, compare and synthesize information and perspectives from multiple countries and/or fields on water sustainability issues. The project objective is to create a stronger knowledge of the variations between international / intercultural approaches to sustainability of water resources. This paper addresses watersheds from a geographical point of view as part of the contribution of the United States to the multi-national effort of IDEAS to offer international perspectives on water sustainability.

1.1 Watershed Practice Module: Format

Watershed sustainability data will be incorporated into modules that use a triple teacher education strategy: lecture, field trip, and seminar. Module content Progress is continuous as the IDEAS Working Group meets in the fall of 2007. As watersheds as natural systems, the lecture component will address their importance to water resources, economic viability, ecological health, and other relevant aspects of sustainable progress. The importance of geographical knowledge and techniques will be highlighted as they relate to watershed understanding and stewardship. Case studies of watershed sustainability issues and prospective alternatives will be discussed. It will outline sources of information on the values of sustainability in the watershed, along with current instructional resources. The field trip will involve studying watershed environments and effects, taking into account issues, issues, and management. The goal is to comprehend the nature of watersheds by direct observation, evaluate the extent to which sustainable progress methods exist or are necessary, and suggest feasible alternatives. The seminar will require the discussion and application of data learned so far, significant review of current materials, and presentation of lesson plans created for a particular teaching setting by the students. There will be encouragement for intercultural examples.

2. Watershed Sustainability and the National Geography Standards ' Six Essential Elements:

Watersheds are the landscape's eminently geographical elements. Geography offers an outstanding collection of views, expertise and abilities to build a watershed understanding as significant environmental / geographic areas and as complex systems involving interactions between natural procedures and human activities. At present, pre-school geography in the U.S. emphasizes human rather than physical variables and provides only small incorporation of sustainability problems (Bednarz, Petersen, & Bednarz, 2007). Nevertheless, throughout

Geography for Life, the U.S. National Geography Standards, the physical geographic elements of settings are threaded (GESP, 1994). Geography for Life describes six "Essential Elements" with eighteen "Standards" in total to reflect what a "Geographically Informed Person" should know and comprehend. The paper also lists five fundamental abilities outlining the procedures of problem-solving applied in the search for geographical answers. Many U.S. geography curricula have been affected by national standards. States and supplied a foundation for student accomplishment statewide testing. Therefore, geographic education on sustainability in the watershed (or other sustainability subjects) directed at educators will profit from using national standards as a fundamental structure. This strategy will assist educators educate their learners on the significance of water sustainability by showing how watersheds fit into the curriculum framework that they are likely to use in geography teaching. The content described here is consistent with the six essential elements of the National Geography Standards (GESP, 1994): 1) The World in Spatial Terms, 2) Places and Fields, 3) Physical Systems, 4) Human Systems, 5) Environment and Society, and 6) Geographical Uses. Each of the six Elements, and most of the Standards contained therein, may be linked to geographic education on watersheds and their effect on sustainability of water resources. This article only examines the six elements, but it is possible to expand the material to include particular standards. The Elements are not designed to depict a step-by-step process sequence as outlined below in their presentation order in Geography for Life. Watershed sustainability studies, because they are interrelated, may include elements of all or most of the elements.

2.1 Geographic Information and Analysis for Watershed Sustainability:

This element involves learners in the investigation and evaluation of interesting geographic information on the watershed(s). This will include a mixture of map interpretation, remotely sensed picture analysis (multimedia, multi-scale, multi-date, multi-spectral), fieldwork, information collection and display, and geographic information systems. In this analytical process, the progress of a mental map, a conceptual model of the watershed region, or a hardcopy map, either drawn on paper or drawn using a computer. Geography provides a suite of spatial-analytical and process-oriented methods that can enhance problem solving and watershed sustainability decision-making and its impact on water quality. Maps, data, and information can be obtained from the U.S. about nearly every U.S. watershed and its river system. The "Science in your Watershed" website of the Geological Survey (2007) and the World Conservation Union (2007) offer an internet atlas, "Watersheds of the World: Atlas," with maps and data on significant watersheds around the world. The data offered by these websites invites comparative studies of watersheds in various places, of various dimensions, or of various physical or human features. Geographical similarities also call for research. Analysis scale may vary from local to field or global.

2.2 Watersheds as Geographic/Natural Fields:

Watersheds, the catchment regions for rivers and streams, are perhaps the most natural, logical, ecologically significant and least abstract geographical components of the land fields of our planet. It is essential to know the nature of watersheds as geographic areas that differ with respect to their environment / geographic location. Fields operate as conceptual models, spatial instruments to seek to comprehend how, why and how regions vary or are comparable to specific characteristics. Within other areas, watersheds exist and also contain subfields. These spatial divisions and subdivisions may be based on human or physical criteria, many of which may have an impact on a watershed. Fields can be described by the existence or lack of certain attributes such as landform features or vegetation associations that can be visually discriminated against and mapped. Fields can also be defined by features that we cannot see, but we can monitor and measure, such as quantitative variables representing hydrological, climatic, vegetative, or geological conditions, or human activity-related factors. Because watersheds are delimited by drainage divisions, physical characteristics that can generally be clearly traced, learners can easily conceptualize and understand the field boundaries of a watershed compared to the edges of other areas that are more abstract, statistically defined.

2.3 Watersheds as Natural Systems:

Watersheds provide great examples of natural / environmental processes as they work at the hydrosphere, atmosphere, lithosphere, and biosphere interface. Almost every land surface on Earth is component of a watershed, and the streams that occupy these basins tend to create well-integrated natural systems that involve water, soil, rock, land, vegetation, and wildlife. Watersheds share the stream number hierarchy and can be divided into smaller sub-basins. For the whole system or for any sub-basin, water quality can be monitored. As streams form an downstream flow network, some issues can be tracked upstream or downstream. A watershed's environmental procedures and elements are interrelated and can be examined within a hydrological cycle local / field subsystem. Problems in one portion of the watershed scheme are probable to cause issues elsewhere, and issues with the watershed can also impact groundwater resources directly. The water quality affects biotic habitats in these basins, which is a function of the watershed's environmental circumstances. Watersheds are open systems, and the primary throughput is water, which is continuously impacted by the quality of the inflow and the geographic physical-human circumstances the water flows through. Increasing human populations and intensities of land use place pressure on habitats and water quality in the stream system, sometimes to the point where significant limit conditions are reached. Domesticated animals and human operations add complexity to the watershed scheme and influence feedback interactions. Interactions between a watershed's physical procedures and characteristics set the environmental phase on which human systems and other natural systems function and impact existing sustainability boundaries.

2.4 Human Influence and Reliance upon Watersheds:

Watersheds also operate as one based on population densities, cultures, values, economics and politics under a multitude of spatially variable human factors. Types and intensities of land use and densities of settlement varying from sparse and isolated to rural, suburban or urban, as well as their extent and location, are elements of the human landscape providing a different set of environmental conditions within a watershed The way a watershed is viewed and its resources are also influenced by different human requirements and cultural views. Surface water from watershed sources offers the world's population with much of the potable water energy. Many human populations are focused along riparian corridors — rivers tend to attract and distinct populations. Growth in the population improves the need for fresh water and also reduces the human effect of this vital resource on these resources, particularly along waterways. Growing populations involve an rise in irrigated farming, which draws strongly from water resources on the ground. The quantity and quality of freshwater resources, unfortunately, cannot keep pace with population growth and the resulting rise in water requirements. Increasing financial progress is also the equivalent of an increased need for water. One of humanity's most important environmental duties is to monitor, maintain and protect the quality of freshwater resources. Delimited by humans, often regardless of topography, most political and administrative limits do not coincide with the limits of the watershed. A system of streams can flow through or through many counties, towns, countries, or more than one country. These jurisdictions may have very different needs and strategies to use and manage their watershed part and their water resources. In the foreseeable future, divergent political and economic agendas that influence water resource competition will continue to be a issue.

2.5 Human-Environmental Interactions in Watersheds:

Few of the main watersheds of the world and the rivers that drain them were untouched by human activity, and many were considerably modified. Nilsson, et al. (2005, 405) summarized the enormous global scope of this human effect by saying, More than half of the world's 227 largest rivers are severely or moderately fragmented by dams, diversions and canals. "Moreover, they state that dams have a significant effect on freshwater ecosystems and that water withdrawal and use on dammed rivers is about twenty-five times higher than free-flowing rivers. Also a issue is the loss of evaporation from impounded water in reservoirs, as well as the increase in salinity in reservoirs in arid areas. John Wesley Powell (1879) thought that splitting land along watershed borders would create a feeling of community among inhabitants who would share that drainage area's water resources. The ideal strategy to sustainability is cooperative management of a watershed system as a whole. This management strategy is urged by the U.S. Environmental Protection Agency (1996,

1997), and cooperative river basin authorities have been set up to encourage a unified effort to protect a shared watershed. However, human tries to move water from watershed to watershed imply that watershed management and sustainability choices are processes that are spatially distant and can be divided from those that use water politically. Weatherford (1990) called these combinations of natural-artificial water systems "hydro commons," pointing out that this approach to water distribution spreads the "community" of water users across a large field. Water is piped or channeled from more humid regions (e.g. mountain fields) in many fields experiencing seasonal droughts, which adds to a human-environmental disconnection with the water source. Watersheds are affected by human beings and vice versa. Due to the relationships between individuals and their physical environment that affect watersheds, the integrative nature of geography makes it easy to understand sustainable management and stewardship of the watershed.

2.6 Geographic Inquiry Applied to the Sustainability of Watersheds:

It is essential for the geographically informed person to have an understanding of the processes, attributes and conditions of natural and human systems, as well as their interaction and spatial configuration. A strong education in geography not only involves expertise and learning, but also emphasizes comprehension through investigation, i.e., geography. Geographical investigation means having the background and capacity to ask appropriate geographical questions and tries to answer them. Learning how to think, reason, seek to understand and synthesize geographic information and its spatial context is beneficial for solving problems and finding answers. These procedures and the insights they produce also promote informed decision making that involves many significant problems affecting sustainability in the watershed. Geographical understanding enables us to understand and understand today's environments, understand past impacts on the circumstances we are experiencing and observing today, and create logical and sensible predictions of present trends into the future. With this context, citizens should be well educated about sustainability problems and choices and be well ready to impact them.

3. CONCLUSION:

The IDEAS project seeks to inform future geography educators on how and why, based on field, nationality, or culture, views about water as a resource may vary. An efficient vehicle for education on this significant subject can be a teacher training module on these and other geographic aspects of water resource sustainability. The National Standards in the U.S. can be used to structure data on sustainability to suit present curricula, as in this instance dealing with watersheds. Education on environments and their sustainability has been shown to influence positive changes in watershed management as well as a variety of natural resources (Natural Resource Law Center, 1995). Future geography teachers, as agents of change, can

use the data and equipment they acquire and create to instill in their learners the understanding they need to be educated citizens, aware of the vital nature of watersheds and their role in water resource sustainability.

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