

Increasing the Visibility of Watershed Management as a Land Management Profession

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Abstract.—Population increases will continue to severely pressure water resources in the 21st century. Consequently, the importance of watershed management will increase. The potential demand in the next century for information on, and individuals skilled in, watershed management raises several important issues: the need for watershed management to have a central voice to gain the attention of political, government agency, university, and business leaders; the adequacy of watershed management professional training; the need to identify watershed management as a discipline; and the need for a new organization with a central focus on watershed management to support for watershed management professionals. This paper addresses and solicits inputs on these issues to advance the watershed management into the 21st century.

Introduction

The importance of watershed management will continue to grow in the 21st century (Rango 1995). Population increases will continue to put severe pressure on finite and, in some instances, diminished water resources (Simon 1998). Other natural resources derived from managed watersheds, including wood, range, wildlife habitat, and recreational opportunities, will also be in high demand. In addition, many countries recognize the need to sustain ecosystems in order to perpetuate the flow of goods and services that natural resources provide. These countries have found the political will to go on record in the Santiago Declaration on forest sustainability to support sustainability as a goal of resource management. As Brooks et al. (1992) pointed out, proper watershed management is really the key to sustainability.

In an era when specialization is the model in most professional disciplines, watershed management is an exception. Watershed management synthesizes informa-

tion by stressing integration of information from different disciplines to cope with complex spatial and temporal issues and problems that are due to the linkages between land and water (i.e., cumulative watershed effects). What is watershed management?

Satterlund and Adams (1992) state that: "Watershed management is the management of all the natural resources of a drainage basin to protect, maintain, or improve its water yields." Similar definitions, which are either more narrowly or widely defined, have been used throughout the 20th century (Neary this publication). Lee (1980) described watershed management as the "vocational counterpart" of forest hydrology. We suggest that watershed management is a widely defined discipline that represents an approach to natural resource management encompassing many disciplines. Watershed management provides a workable framework and a system for many disciplines to work together to manage land and water resources in a sustainable manner. Is it a vocation as Lee (1980) suggests? In the case of municipal watershed management, it is a defined vocation as exhibited in job advertisements. In a broader context, although we see watershed management programs and projects emerging because of needs (Neary 2000), there does not yet seem to be a widespread call for professionals in watershed management. But, such a demand may be forthcoming (Lant 1999).

The potential demand in the next century for information on, and individuals skilled in, watershed management raises several important questions. Should watershed management have a central voice to gain the attention of civic, state, national, and international political representatives, government agency decision makers, and university and business leaders? If the answer to this question is "yes", is watershed management a distinct profession? Should watershed management be supported by a professional society that focuses on watershed management? Or, should watershed management gain a greater emphasis within other, recognized professional societies? Is there an adequate number of natural resource professionals trained in, or training for the discipline of watershed management? Are existing natural resources societies adequately developing watershed management professionals for the 21st century?

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Professional Status of Watershed Management

Education

Educational programs have focused on watershed management for several decades. In the early 1960s, many universities in the Western United States offered degrees in Watershed Management. During this era, emphasis was placed on multiple use of public lands, and watershed management provided an important multi disciplinary background for natural resource managers. Interest in such programs leveled off in the 1970s and 1980s. With the rising international and national concerns over sustainable development, interest in the watershed management discipline has re-emerged.

The challenge for academia is to recognize the importance of watershed management and to produce gradu-

ates with the depth and breadth of knowledge and skills to provide a watershed management perspective to engineering, natural resource, urban development, social, and political programs. However, several questions need to be asked. To what extent can or should people be educated in watershed management? How best can this education be accomplished? What should constitute an academic program in watershed management? Should an academic program in watershed management be a graduate degree following an undergraduate degree in a natural resource discipline, a basic science, or an engineering field? Does an adequate professional society exist to ensure the continued development and certification of watershed management professionals?

Professional Society Support

Professional support for watershed management is currently fragmented among many natural resources and land management professional societies (table 1). To analyze the level of support of and interest in watershed

Table 1. Organizations with activities and a level of focus in watershed management.

Organization Name	Type	Focus
American Fisheries Society	Science	Low
American Geophysical Union	Science	Low
American Institute of Hydrology	Science/education	Medium
American River Management Society	Management	Medium
American Society of Agricultural Engineers	Management/science	Medium
American Society of Civil Engineers	Management/science	Medium
American Water Resources Association	Science/education	High
Ecological Society of America	Science	Low
Geological Society of America	Science	Low
International Association of Hydrological Sci.	Science	Medium
International Association on Water Quality	Trade/management	Low
International Water Resources Association	Science/management	High
IUFRO Unit 8.03.02 Forest Hydrology	Science	Medium
IUFRO Unit 8.04.04 Watershed Management	Science	High
National Water Resources Association	Management	High
Society for Range Management	Science/management	Medium
Society of American Foresters	Management/science	Medium
Society of Wetland Scientists	Science/management	Medium
Soil and Water Conservation Society	Management	Medium
Soil Science Society of America	Science	Low
Water Environment Federation	Education/technical	Low
Water Quality Association	Trade	Low
Watershed Management Council	Educational	High

management by these organizations, we will examine their mission statements. Only those with medium or high levels of focus are considered in this discussion.

The Society of American Foresters (SAF) mission "...is to advance the science, education, education technology, and practice of forestry; to enhance the competency of its members; to establish professional excellence; and to use the knowledge, skills and conservation ethic of the profession to ensure the continued health and use of forest ecosystems and the present and future availability of forest resources (i.e., water, wood, wildlife, recreation, range, nontraditional products, etc.) to benefit society...." (SAF 1999). The SAF Water Resources Working Group "...Focuses on forest hydrology and watershed management....". This organization's focus is forestry and forest land management, although watershed management is part of one of its smaller working groups. The SAF publishes several journals (e.g., *Forest Science*, *Journal of Forestry*, and the regional *Southern*, *Northern* and *Western Journal(s) of Applied Forestry*).

The Society for Range Management's (SRM) mission is "...to promote and enhance the stewardship of rangelands to meet human needs based on science and sound policy." (SRM 1999). As part of its concern about "...studying, conserving, managing, and sustaining the varied resources of the rangelands which comprise nearly half the land in the world....", this society addresses watershed management. Unlike the Society of American Foresters, the SRM organizational sections are geographical rather than disciplinary. Thus, they do not focus on watershed management. Two journals are published by the SRM, the *Journal of Range Management* and *Rangelands*.

The American Institute of Hydrology (AIH) was established primarily to "...strengthen the standing of hydrology as a science and a profession by: establishing standards and procedures to certify individuals qualified in hydrology, establishing and maintaining ethical standards, providing education and training in hydrology, and providing the public and government advice and guidance..." (AIH 1999). Although the AIH provides certification for hydrologists, it does not implicitly list watershed management as a focus. The AIH publishes one professional journal, *Hydrological Science and Technology*.

Two divisions of the International Union of Forest Research Organizations (IUFRO), 8.03.02 (Forest Hydrology) and 8.04.04 (Watershed Management, previously named Erosion Control by Watershed Management) emphasize watershed management (IUFRO 1999). These organizations are research-oriented and do not serve management professionals. They also do not have regular publications. Division 8.03.02's mission is, "To promote and advance the science of forest hydrology and to encourage the exchange of information and ideas....". Division 8.04.04 focuses on erosion, but it considers the broader concepts of the physical, chemical, and biological systems

that interact within a watershed to produce an array of landforms, channels, streamflows, and sediment yields. This approach evaluates erosion control projects as part of larger watershed management efforts.

The International Association of Hydrological Sciences (IAHS) is the oldest nongovernmental organization concerned with hydrology and water resources (IAHS 1999). Established in 1922 "...for the study of all aspects of hydrology, publication of research results, and the initiation and coordination of research....", IAHS has a primary focus on research related to hydrology and watershed management. IAHS publishes the *Hydrological Sciences Journal* and other special publications, but does not certify its professional members.

The Soil and Water Conservation Society (SWCS) "...fosters the science and the art of soil, water, and related natural resource management to achieve sustainability...." (SWCS 1999). SWCS is an international organization of professionals and students that promotes soil and water conservation. This organization publishes the *Journal of Soil and Water Conservation* and certifies members in erosion and sediment control.

The Society of Wetland Scientists (SWS) was founded "...to encourage and evaluate the educational, scientific, and technological development and advancement of all branches of wetland science and practice, and to encourage the knowledgeable management of wetland resources...." (SWS 1999). SWS publishes the journal *Wetlands* and provides a certification program. As indicated in its objectives statement and name, SWS is more narrowly focused on wetlands.

The American River Management Society (ARMS) is a recent organization founded "...to promote the protection and management of river resources...." (ARMS 1999). ARMS was originally formed to promote river recreation, but it has since broadened its mission. This organization is dedicated to understanding river basin management using an ecosystem management approach, and developing member professional skills.

The International Water Resources Association (IWRA), an international organization promoting interdisciplinary dialog and cooperation related to water resources, was founded for the "...advancement of water resources planning, management, development, technology, research and education at international regional and national levels..." (IWRA 1999). IWRA promotes international dialog, information dissemination, and water resource programs through the triennial World Water Congress. The IWRA publishes the journal *Water International*, and does not have any certification program.

The National Water Resources Association (NWRA) is a federation of local and state agencies, commercial companies, and individuals that provide political advocacy for sound development, use, and protection of water and

land resources at a national scale. This group publishes specialty papers, but no journals.

The Watershed Management Council's (WMC) original focus was on California issues, but it has since expanded to include concerns in 28 state and 3 countries. WMC has a wide range of activities central to its mission of "...promoting proper watershed management...." (WMC 1999). The council publishes a newsletter and is an advocate for watershed management, but it does not function as a professional society.

The American Water Resources Association (AWRA), a primary professional support organization for watershed management professionals, has a mission "...to promote understanding of water resources and related issues by providing a multi disciplinary forum for education, professional development and information exchange." (AWRA 1999). AWRA promotes water resources research and management through special conferences and proceedings, the *Journal of the American Water Resources Association*, and the *Water Resources Impact* newsletter. The AWRA is organized into geographic chapters. Of the membership areas of expertise, hydrology (19%), water resources (14%), hydrogeology/groundwater (13%), water management (10%), and water quality (6%) are the most common (AWRA 1999). Watershed management is not listed as an "expertise code" on the AWRA membership application. The AWRA does not provide any certification similar to some other professional societies (Soil Science Society of America, Soil and Water Conservation Society, Society of American Foresters, American Institute of Hydrology, etc.). However, AWRA is currently sponsoring a national dialog on concerning the need for professional watershed management certification (Ditschman 1999, Seaburn 1999, Pawlukiewicz and Norton 1999, Witter et al. 1999).

Both the American Society of Civil Engineers (ASCE) and the American Society of Agricultural Engineers (ASAE) recognize the importance of watershed management within the engineering profession (ASAE 1999, ASCE 1999). ASAE has a Soil and Water Division within its professional structure, and the ASCE has a Water Resources Engineering Division and a Water Resources Planning and Management Division. These divisions of ASCE sponsor a major watershed management symposium every 5 years. The next symposium, "Watershed Management 2000: Science and Engineering Technology for the New Millennium", June 2000, contains 22 topic areas that relate to watershed management (ASCE 1999).

The support provided by these organizations is important to the practice of watershed management. However, debate remains about the need to organize a professional society, or some other form of organization, that focuses its institutional mission solely on watershed management and watershed management practices.

Soliciting Input

A questionnaire was available to the conference participants, soliciting their thoughts on the need to identify watershed management as a separate profession or heighten the visibility of watershed management as a land management discipline. These participants, representing international, national, and regional perspectives, were a diverse group of researchers, managers, administrators, and other public appreciative of the contributions that watershed management has made to land stewardship in the past, demonstrated in this conference, and anticipated in the future.

Some key questions asked were:

1. Does watershed management need a heightened level of recognition as a separate land management profession?
2. If so, are watershed management professionals adequately supported by existing societies and organizations?
3. What professional organizations do you belong to?
4. What could these organizations do to improve their support to watershed management professionals?
5. Would you be willing to support a separate organization called the Watershed Management Society?
6. What type of publications should a separate watershed management organization support (e.g., newsletters, specialty papers, proceedings, journal, etc.)?
7. Should a separate watershed management organization provide a certification service?

Future Follow-Up and Recommendations

A summary of responses to this questionnaire will be available to the participants, and published on the University of Arizona's Watershed Management web site (UA 1999). The authors will develop a follow-up paper for publication in a widely distributed professional journal. Future actions could include examination of the possibilities of establishing a separate watershed management

society, participating the AWRA's watershed management professional certification dialog, or encouraging other land management professional societies (ARMS, ASCE, SAF, SRM, SWCS, SWS, etc.) to become more active in the area of watershed management professional development and support. The authors encourage readers to examine the current discussions going on within the AWRA (Ditschman 1999, Seaburn 1999, Pawlukiewicz and Norton 1999, Witter et al. 1999).

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