USDA Forest Service Policy on Managing Groundwater Resources

Stephen P. Glasser
National Water Rights and Uses Program
USDA Forest Service, Washington, DC

Until now, the USDA Forest Service lacked a national policy on managing groundwater resources of the national forests and grasslands. There are many problems and missed opportunities for resolving groundwater caused issues and concerns that the agency can best tackle with a nationally consistent and comprehensive groundwater policy. The policy proposed in this paper fulfills all of those needs: it covers water quantity and quality issues, clean-up of contaminated groundwater, commercial bottling operations, inventory and investigation procedures, and special use permitting of new wells.

Keywords: *groundwater resources, policies, permitting, aquifers*

Background

In the past, the USDA Forest Service personnel responsible for managing the national forests and grasslands too often ignored the groundwater below their feet, tried hard to do so, or assumed that the same agency policies for managing surface water applied equally to groundwater. There were exceptions, of course, if some kind of sub-surface activity was proposed, such as mining, oil, gas or water well drilling, or clean-up at an abandoned mine site. The laissez-faire strategy worked pretty well in many cases, but over time there has been a steady increase in the number of cases where those strategies failed and caused adverse impacts to the lands or the natural resources located on those lands. By the late 1980s, hydrologists and geologists in the agency's national headquarters were working together to develop a national policy for groundwater management.

Bureaucratic turf wars between the two staff directors involved in this joint effort prevented the draft groundwater policy from being issued in 1989 as it could have been. When I arrived in the Washington Office late in 1989, I pursued tackling the bureaucratic issues for a year or so without success, then gave up on it. By the late 1990s with new directors in place, I again pursued bringing the draft policy to fruition by sending it out to the Regions for review and comment. I also formed an ad hoc team to revise the earlier draft based on the comments received and new information that had become available.

It occurred to me that field personnel would need two companion documents to this new policy to be able to use it successfully. One would be a user-friendly handbook or desk guide on techniques and methods proven useful for investigating, managing or mitigating groundwater underlying National Forest System (NFS) lands. The second document would be a compilation of federal and state laws, rules, regulations, and case law pertaining to groundwater in each of the 43 states that have NFS lands. Both of these documents have been completed.

Current Groundwater Issues and Concerns

Freshwater aquifers currently supply 37 percent of the drinking water that Americans depend upon annually. A total of 83.3 billion gallons per day (bgd) (315 million cubic meters per day [Mm^3d])was withdrawn from the groundwater resource in 2000, up 14 percent from 1985, according to the U.S. Geological Survey (USGS 2003). Some 56.6 bgd (214 Mm^3d) was used for irrigation, 16 bgd (60.6 Mm^3d) for public water supply, 4.4 bgd (16.6 Mm^3d) for mining and 3.5 bgd (13.2 Mm^3d) for individual domestic water needs.

The U.S. Geological Survey identified 21 groundwater provinces in the United States (Meinzer 1923). Most aquifers within these provinces are found in valleys, on the Great Plains, and in relatively flat terrain along the East and Gulf coasts or the Great Lakes. Since NFS lands often are located in mountainous areas of the West and

M Furniss, C Clifton, and K Ronnenberg, eds., 2007. *Advancing the Fundamental Sciences: Proceedings of the Forest Service National Earth Sciences Conference, San Diego, CA, 18-22 October 2004*, PNW-GTR-689, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

along the Appalachian chain in the East, they are not usually overlying the major aquifers. There are some exceptions: some national forests and grasslands from Texas through Nebraska overlie the Ogallala and Edwards aquifers; portions of the Osceola and Ocala National Forests in Florida overlie the Floridian aquifer; several forests in North and South Carolina overlie coastal aquifers; some national forests in the Great Lakes basin overlie aquifers there; portions of the Custer National Forest in Montana, the Humboldt-Toiyabe National Forest in Nevada, and several national grasslands in Wyoming, North and South Dakota, Colorado, Kansas, Oklahoma, Oregon and New Mexico overlie important aquifers. Some of these aquifers are being heavily pumped with increasing risk of severe depletion that may cause many unintended consequences to both people and ecological values of those places.

Almost all national forest lands, wherever located, also serve as groundwater recharge areas because they typically receive more annual precipitation than nearby valley areas. This is a very important function they serve in the water cycle or water budget that hydrologists and water supply engineers plan on. It is very important to ensure that groundwater recharge areas do not serve as points of contamination of the aquifers. Yet, there is no national or even regional inventory of groundwater resources underneath NFS lands in this country. We must start to work on one soon; this paper supports that undertaking.

Based upon many experiences that the U.S. Environmental Protection Agency (EPA) has had since 1970 with clean-up of contaminated groundwater, it has become obvious that preventing contamination of groundwater is by far the least costly and most environmentally sound way to ensure the usability of that resource in the future. The Forest Service intends to follow such an approach, especially in the near future. This agency has only very limited hydro-geological expertise - only about six employees out of a professional workforce of about 8,000 currently have such a background.

The state laws that regulate groundwater resources too often ignore the real connections between groundwater and surface water that exist in nature. Many states completely separate the two kinds of water in their laws, or encourage maximum development of groundwater, sometimes with devastating consequences such as land subsidence, loss of wetlands, salt-water intrusion, loss of surface water flows, and other effects. California does not even have a state groundwater law. Some state laws were written in the 18th or 19th centuries and need to be modernized, in the opinion of many water experts and this author. The Forest Service respects the authority of states to allocate water and control water quality as delegated by the Congress through federal laws. The agency adheres to state water rights laws to the extent they are not incompatible with federal laws that govern the proper administration of NFS lands and resources. To ensure that Forest Service employees are familiar with state groundwater laws, a document that includes a short summary of the laws and includes Internet hot-links to the actual text of all of these state laws and regulations in the 43 states that contain NFS lands has been drafted (Glasser and Chapman 2006). That document will be posted on a Forest Service website in 2005.

Groundwater Policy Components

There are a number of component parts to the proposed agency policy for groundwater (USDA Forest Service, In press) which will be briefly discussed in this paper. They include: objectives, responsibilities, definitions, assessments, uses, clean-up of contaminated groundwater, source water, permitting, monitoring, fees, legal aspects, and sustainability strategies.

Objectives

The Forest Service will manage groundwater underlying NFS lands to ensure the long-term protection and enhancement of these aquifers and other groundwater systems, surface streams, springs, lakes, ponds and their associated riparian and aquatic ecosystems.

Further, authorization of consumptive water uses by other parties will occur only if such authorized uses can adequately conserve, restore, or protect dependent resources and values over the long run.

Both of these objectives are based upon a number of federal statutes and their implementing regulations governing the National Forest System from 1897 to the present.

Responsibilities

The new policy includes a number of specific responsibilities of certain Staff Directors in the Washington Office, Regional Foresters, Station Directors and the Area Director; Forest Supervisors and Research Project leaders; and Project, Program or Team Leaders in the Research and Development Branch.

Definitions

Some 17 technical terms used in the new policy are clearly defined to ensure understanding and common usage in the future.

Assessments

The use of appropriate methods, models, tools, techniques to investigate, inventory, assess or quantify the quality and the volume of groundwater resources underlying NFS lands is very important in achieving success in such endeavors. Temporal and three-dimensional spatial scales are also critical elements in these processes. The new policy and its related Technical Guide for Managing Ground Water are intended to be used in tandem by field practitioners. Some cautions on the use of these methods and tools are also noted in both documents.

Groundwater Uses and Impacts

The Forest Service has authorized many water wells that pump groundwater from underneath NFS lands, and it also has hundreds of its own water wells that serve administrative sites, recreational facilities and other uses. These uses will continue and new ones will undoubtedly be added in the future. The Forest Service needs to begin to quantify the amount of groundwater being withdrawn from beneath its lands by all water users if we are to work toward sustaining groundwater as a natural resource in perpetuity.

A provision of the new policy is a requirement to install water meters on all pipes four inches or larger in diameter used to withdraw groundwater for any purpose. This requirement will apply to both authorized pipelines and to agency owned pipelines. Annual withdrawals in cubic feet of water will be reported to the Director of Watershed, Fish and Wildlife in the Washington Office.

The new policy addresses impacts on groundwater related to mining, oil, gas and coal bed methane operations, geothermal facilities, tunneling projects, sand and gravel removal, and landfill operations that need to be recognized and appropriately addressed at the local, state or regional levels. Readers are referred to appropriate portions of Forest Service Manual (FSM) chapters 2810, 2820, and 2880.

Clean-up of Contaminated Groundwater

Direction is provided to prevent future contamination from agency authorized or conducted activities, and where contamination has already happened, to be pro-active in remediation. There is abundant existing direction and technical guidance on planning and implementing clean-up operations in FSM chapter 2160, the National Contingency Plan, USDA Manual DM 5600-1 Chapter V, and requirements of the Comprehensive Environmental Response Compensation and Liability Act of 1980 which need to be followed by anyone contemplating a groundwater clean-up operation.

Conjunctive Use of Surface and Groundwaters

The new policy states that one should always presume there are hydrologic connections between surface water and groundwater on NFS lands unless it can be clearly proven that there are none in the local setting. This is a reasonable, conservative assumption that we think is very important to achieving long-term sustainability of the groundwater resource at a minimum of cost. There are many real world cases where contamination of water occurred because it was wrongly believed there were no connections between ground and surface waters; in other cases, too much pumping of groundwater has dried up surface waters in streams, ponds, lakes, and wetlands. Also, removal of surface waters by diversion or pumping has caused declines in groundwater levels because the groundwater recharge mechanism has been shut off.

The Forest Service recognizes the growing trend toward conjunctive water management by many water utilities, districts, and planners. The agency needs to assure that its employees are also aware of this trend and are equipped to deal with it if such proposals to make use of surface water, groundwater or both, that originates under, on, or from NFS lands, arrive on their desks. Specific direction on evaluating these applications is given in the next section of FSM chapter 2543 - Permitting.

Permitting

A two-phase process for evaluating applications for new ground water resource developments of any kind on NFS lands is provided in this section of the policy. The reader should also see the paper by Martin and Loomis in this publication. In fact, much of the national policy on permitting water wells included in FSM 2543.5 originated from the process used by the Tonto National Forest (New Mexico) and was then codified by the Southwestern Region of the Forest Service.

Assuming there are no alternate water supplies outside the national forest, the first or exploratory phase of permitting is the information gathering and screening phase where, after National Environmental Policy Act (NEPA) analysis is completed, the project proponent may be authorized to drill one or more test wells and perform a 72-hour continuous pump test while measuring effects on the water table and surface waters nearby. Often computer modeling, additional drilling of wells, and surface water monitoring sites may be required. If it appears there is a large enough water supply of sufficient quality that can

be developed in an environmentally safe and economically feasible manner, then plans for development are evaluated and documented in accordance with NEPA requirements.

The next phase is the issuance of permits for the construction of the water production facilities and associated infrastructure if located on NFS lands, once a NEPA decision and all applicable state authorizations are in place. FSM 2711 provides additional guidance about the permitting process. Monitoring and mitigation measures should be included in the permit and the annual plan of operations by the permittee.

Laws, Rules and Regulations on Groundwater

There is no single federal law that addresses groundwater in a comprehensive manner. The Safe Drinking Water Act delegated primary responsibility for protecting drinking water to the states, whether from surface water or groundwater. The Clean Water Act implies that groundwater is to be managed like surface waters, but it does not set clear goals for managing groundwater.

State laws, rules and regulations for the allocation of groundwater among competing water users exist in almost all states. They are based upon one or more basic legal theories: absolute ownership, correlative rights, prior appropriation, and reasonable use. Many states artificially separated their surface water right laws from their groundwater laws, which has led to some damage to groundwater resources.

The Forest Service policy is to follow state water laws substantially and procedurally as long as they do not conflict with federal laws applicable to management of NFS lands and resources. In an effort to increase Forest Service personnel's awareness of state water laws and as an aid to water attorneys in the USDA Office of the General Counsel, an 86-page compendium of these laws, their regulations, and pertinent case law in the 43 states with NFS lands has been completed as a separate document. Contact the Forest Service Washington Office, Fish and Wildlife staff about how to access this document.

Strategies for Sustaining Groundwater

The new policy contains five strategies designed by the U.S. Geological Survey (Alley et al. 1999) to sustain the availability and usability of groundwater resources in the United States. These strategies should work on NFS lands. There may be additional strategies that would work in local areas as well; the point is to try to use some strategy for many years or decades to ensure that the groundwater resource is not totally depleted, contaminated to a point where it becomes unusable by people or by dependent animal or plant life.

Literature Cited

Alley, WE, TE Reilly, OL Franke. 1999. Sustainability of ground-water resources. Denver, CO. U.S. Geological Survey Circular 1186. 79 p.

Glasser, SP and M Chapman. 2006. Summary of state ground-water laws, regulations, and case law. Washington, DC. USDA Forest Service. 86 p.

Meinzer, OE. 1923. The occurrence of ground water in the United States. Washington, DC. U.S. Geological Survey Water-Supply Paper 489. 321 p.

USDA Forest Service. In press. Forest Service Manual chapter 2543, Ground-water management. Washington, DC. 20 p.