

## Watershed Management Plans: Developing a guide for future river management

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The management of water and watersheds is emerging as a critical requirement for governments, countries, and people. Historically management of rivers has been focused on localized application of short-term fixes that attempt to control actions. The resulting effects of localized engineering actions may or may not have the desired effects and the long-term cumulative effect of reducing risk and protecting ecosystem integrity has not been adequately addressed.

The approach proposed in this paper builds on a belief that effective and sustainable management and recovery of river systems and the ecosystems that they support require a watershed/river basin approach. The approach builds on existing research, management and restoration work being accomplished in Japan and elsewhere in the world with the intent of coordinating and collaborating actions at a watershed scale. The approach recognizes that watersheds are affected by complex, ecological and geomorphic processes. A watershed approach will benefit river basin management by integrating actions and knowledge, and by treating the watershed as a unified functional system.

Cumulatively these criteria help to describe an **Eco-Geomorphic approach** to restoration that can improve ecological values of the site, provide a more functional river environment, retain existing sediments behind the dam, and mitigate negative impacts associated with the return of a natural sediment supplies. The design for restoration activities should incorporate these types of strategies that provide significant improvements over purely structural approaches.

Successful watershed-scale management efforts use scientific methods and principles to gather the critical information and knowledge that support good decisions. A Watershed Restoration Program will provide the analysis and management systems necessary to effectively manage rivers at a watershed scale. The program should bring scientific understanding of watershed and ecosystem processes into effective watershed-scale management program.

Managing the changing river environment will require detailed attention to the changes a river system will experience, and the effects on existing human infrastructure and land-use practices. It will involve developing design approaches at a watershed-scale, using the strategies described in this report. This includes a system that manages sediment and runoff processes throughout the watershed, including sources (e.g. hillslopes and floodplains), transport corridors (channels, culverts and pipes), and sinks (ponds, wetlands, floodplains, estuary, ocean, reservoirs, and channel bed).

Modern strategies to manage flood risks along river corridors utilize *integrated management strategies*. Unlike prior methods that focused on flood management using

in-stream structural approaches, integrated management strategies utilize a combination of in-stream structures, land-use controls, runoff management, and erosion control systems. Integrated strategies consider the complete water cycle and natural river processes. These include water quality, water quantity and the processes that control erosion, deposition and river function. Such strategies recognize that water and sediment sources come from both upstream and upslope sources. By integrating hillslope runoff controls, in-stream structures, watershed stabilization and other features, watershed managers can more effectively manage river and flood impacts.

It is recommended that the next step should be to select several priority watersheds in Japan and begin a strategic and coordinated watershed approach to evaluating future river management activities. This approach will provide an opportunity for the national and prefecture governments to test the potential for implementing a watershed program that is dependent upon knowledge and collaboration.