INTEGRATED WATERSHED MANAGEMENT
A FRAMEWORK FOR DIALOGUE

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INTRODUCTION

In support of Clean Water Act (CWA) and Safe Drinking Water Act (SDWA) integration objectives, the Department of Environmental Quality is piloting an "integrated watershed management" funding strategy. This effort supports the U.S. EPA approved 1999 Nonpoint Source Management Plan that provides one of the first visions in the country aimed toward watershed integration of formal planning requirements and on-ground implementation activities. It also supports implementation of approved Total Maximum Daily Loads and certified drinking water protection plans.

Three traditionally separate programs of Total Maximum Daily Loads (TMDLs), Source Water Assessment and Protection, and CWA Section 319/State Nonpoint Source Grants have a critical overlap of objectives when considered in light of the watershed framework. The watershed is the appropriate scale of consideration for assessing water quality impacts and prioritizing suitable management measures that meet the multiple-objectives of these three programs. The combination of working at the watershed scale fosters local involvement and empowers those most affected to seek incentive funding to voluntarily pursue protection activities. In turn, projects derive from consensus, placed-based watershed implementation plans that are looking at both surface water and ground water to document measurable benefit for beneficial uses.

The vision of achieving watershed integration takes advantage of the inherent overlap between the three programs to provide multiple leveraging opportunities. Private and public partnerships, private investment, and hard and soft in-kind match bring a 40% local match to the table in the majority of projects implemented on the ground. Other programs like the U.S.D.A. "Environmental Quality Incentives Program," administered by the Natural Resource Conservation Service, are also attractive as part of leveraging a diverse set of dollars for implementation, creating a patchwork of integrated funding sources watershed by watershed.

Successful on-the-ground projects for controlling polluted runoff aim at making connections in three primary ways. Those primary ways are the (1) scales of protection, (2) ecological context, and (3) adaptive design strategies. The scales of protection are habitat, the watershed, and ecoregion. Each of these scales are nested within each other, where the cumulative actions of every habitat are going to determine whether a watershed remains hydrologically functional, set within the constraints of the ecoregion. This in turn sets the stage for using an ecological paradigm and the context of beneficial uses as the pretense for both understanding the problems and resolving them systemically with multiple objective solutions. An adaptive management paradigm driven by the feedback loop models should be the underlying strategy for design of programs and implementation projects.

FRAMEWORK FOR DIALOGUE

An "integrated watershed management" approach should strive to create settings for collaboration and innovation by facilitating dialogue among local stakeholders. The over-riding charge under the piloting of this approach is fostering a framework for dialogue among stakeholders for problem solving examining interdisciplinary solutions that are inherently multi-objective. That is, solutions able to address more than one problem simultaneously while addressing the entire resource based on local circumstances.

The Integrated Watershed Management Program proposes a framework for fostering interdisciplinary on-ground implementation activities. Interdisciplinary takes on a meaning of multiple dimensions and scales. In one instance vertical dimensions: encompassing both surface water and ground water quality at the watershed scale. In the other instance, the lateral dimension considering the varied land uses and land covers associated with agriculture, silviculture, mining, and hydrologic/habitat modification activities, as well as those associated with urbanization (e.g., land development, transportation, recreation, etc.). These land uses and activities give rise to varying degrees of nonpoint source pollution or polluted runoff, which is the major contributor to impaired waters.

Further, the Integrated Watershed Management Program views capacity building and outreach at the watershed scale as an important, on-going task. Capacity building creates opportunities for exploring ways of bringing stakeholders with common interests together within a watershed to look at potentially common, multi-objective solutions. These efforts will be characterized as a "placed-based area" focus, able to document on-ground implementation activities annually. Documentation of on-ground implementation activities shown to complement each other are also crucial to maintaining existing funding levels through federal and state grants and loans due to the higher standard for tracking and reporting requirements (e.g., Grants Reporting and Tracking System).

SCALES OF PROTECTION

How does one begin looking for solutions to water quality impairment that meet more than one objective concurrently? There are often solutions for water quality impairment associated with municipal and construction site stormwater discharges, drinking water, nonpoint source pollution, and wastewater that can be used under the same objective of improving beneficial uses. The key is taking a multiobjective solution to those problems by looking at a broader scale of a watershed. At the scale of the watershed, there are often opportunities for integration among the differing pursuits that once considered in light of each other offer a sense of common ground shared among the seemingly competing interests.

An integrated watershed management approach provides an ability to improve coordination and facilitate this view of looking across program boundaries at the watershed scale to both identify and fund on-ground implementation activities that benefit beneficial uses. In this way of improved coordination, existing funds can be put to better use for project implementation at the local level. In turn, the public receives a greater return for their investment and the participants involved achieve an economy of scale. The economy of scale is vital in this day and age where

budgets are tightening and staffing time limited. Better coordination and facilitation translates into leveraging better use and accountability of existing budgets and time (Table 1).

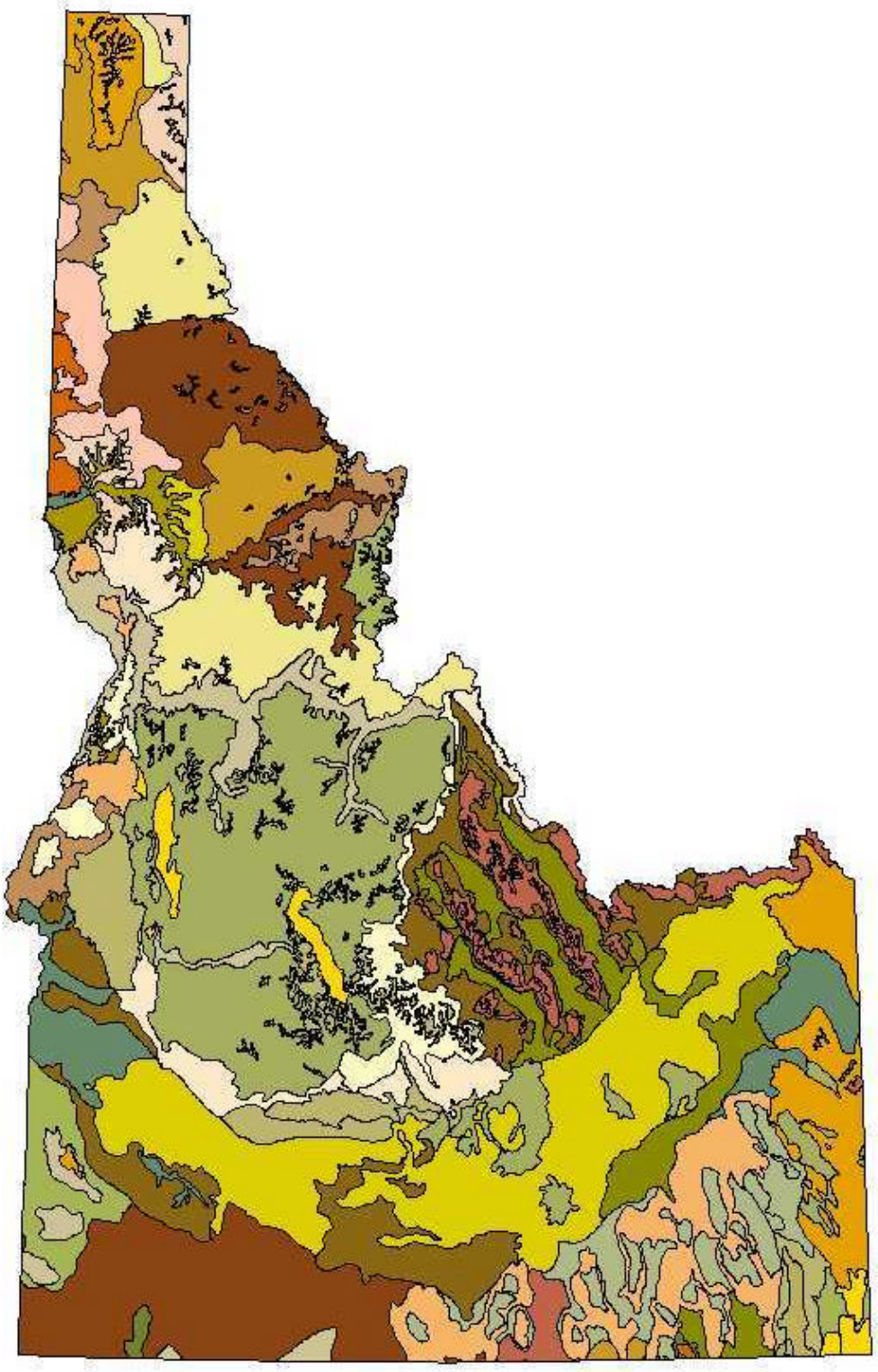
ECOLOGICAL CONTEXT

Ecological regions or "ecoregions" depict interacting biological and physical systems. These biophysical systems include relationships among soils and vegetation, landform, and water. Projects around the country are delineating the "ecology of regions" through an ecological region framework beginning at Level I. Level I is the coarsest level and divides North America into 15 ecological regions. In turn, Level II of the framework further subdivides the continent into 52 regions and Level III to 84 for the lower-48 contiguous United States. The ecological diversity of the State of Idaho is phenomenal encompassing 10 Level III ecoregions. "Ecoregions of Idaho" by McGrath and others (2001) was delineated to a resolution of Level IV or the landscape in the sense of Forman 1995, identifying 71 level IV ecoregions (Figure 1).

Ecoregions provide a spatial framework to manage water bodies for the benefit of the public good. The state water quality standards for Idaho recognize five categories of beneficial uses. Those uses range from advocating for fishable and swimmable waters, to water supply, aesthetics, and wildlife habitat. That is, considered in sum this parallel framework of beneficial uses comprises a working public policy model of an ecosystem. An ecosystem consists of the riparian habitat, found for example, adjacent and within an alpine creek in the Frank Church River of No Return Wilderness to an ephemeral desert tributary in the Snake River Plain. Ecosystems that are fully functional are meeting their beneficial uses.

Where the lateral interaction of the various land management partners provides consistency, State Water Quality Law §39-3601 provides a vertical linkage to ensure that prioritized implementation activities are focused toward impacted and threatened waters. Under State Law §39-3601, community-based advisory committees serve the roles of coordinator and facilitator. They recommend ways to best manage the state's watersheds in accordance with the Clean Water Act. Through a deliberate design, the intersection of community-based advisory committees with that of the diverse interaction among the various local, state, and federal partners not only augments implementation activities toward achieving consistency and statewide priorities, but ensures that performance can be tracked and evaluated for definite, multiple time lines.

Figure 1. Level IV delineation of 71 landscapes in Idaho. View complete descriptions of each of the level IV ecoregions from the map available through the Department of Environmental Quality, Water Quality Division.



ADAPTIVE DESIGN STRATEGIES

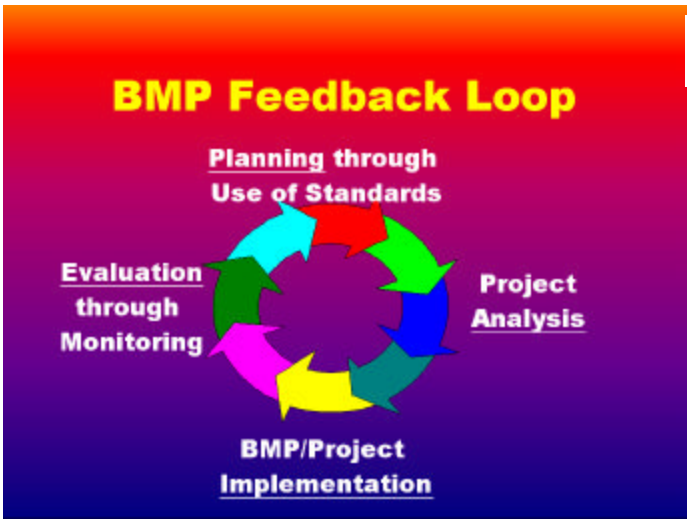
There are a myriad cornucopia of water programs that the State of Idaho oversees through primacy from by U.S. Environmental Protection Agency under the Clean Water Act and Safe Drinking Water Act. The total maximum daily load (TMDL) and the source water assessment programs for example characterize and assess the status of local water resources. In one case, the water body is impaired and listed in order to require a TMDL. The goal, achieve state water quality standards due to a variety of impairments caused by a wide range of pollutant stressors. In contrast, source water assessments establish a level of understanding of how susceptible a source of drinking water is to contamination. This is risk assessment in reality leading to anticipated priorities that if implemented would lead to protecting the water body from impairment. The intersection between both Acts, the common ground shared by them, in this case occurs predominantly through on-ground implementation activities.

Watershed and source water protection from polluted runoff is a locally based and driven endeavor. Locally-based initiatives whether driven by TMDLs, drinking water, permit activities involving best management practices, translate into on-ground projects that ask the same sets of questions. Those questions range from: "what is the affect on the resource" and "what are the known and perceived problems and sources," to "what are the prospective solutions" and "how much needs to be done," to "who's going to do what, when, and why," and ultimately, "how will progress be made." The bottom line, successful projects ask questions and aim to answer them through making connections.

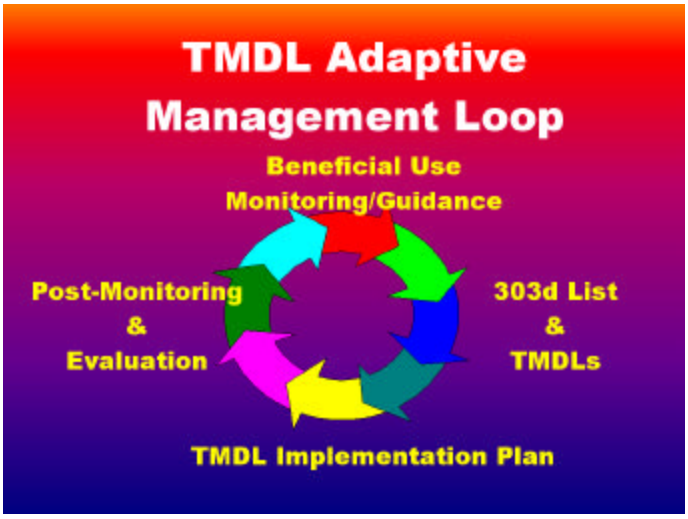
Application of the vision of integration is further understood by taking an adaptive management approach to implementation. Another common feature to locally based initiatives such as TMDL implementation plans and drinking water protection plans are feedback loops. The implementation of best management practices (BMPs) are commonly considered effective when done within the "BMP feedback loop" (Figure 1a). The BMP feedback loop is a commonly recognized process for first planning, assessing, then implementing, and evaluating on-ground projects. The absence of using a feedback loop assures that practices are going to fail for various reasons. Some of the more common reasons for failure are unsuitable measures that do not take into account site-specific conditions, no standard or target, passing problems from one media to another, blown or ambiguous expectations, no monitoring or follow up, and not completing the loop to establish future steps based on the results of the previous steps. Feedback loops are adaptive management in practice and when used by watershed practitioners, enable a thoughtful strategy to evolve in an iterative and adaptive manner.

The same concept of adopting a feedback loop is also applicable to TMDLs through a "TMDL adaptive management loop" (Figure 1b). In Idaho, the TMDL loop consist of: ambient water quality monitoring -> meeting beneficial uses in accordance with the water body assessment guidance -> Section 303(d) listing/Integrated Water Quality Reporting -> TMDL subbasin assessment and load allocation -> TMDL implementation plan -> watershed protection project activities -> post monitoring -> evaluation of beneficial uses -> ambient water quality monitoring.

Figure 1. The three examples of applying an adaptive management model to (a) best management practices, (b) TMDLs, and (c) drinking water protection.



(a)



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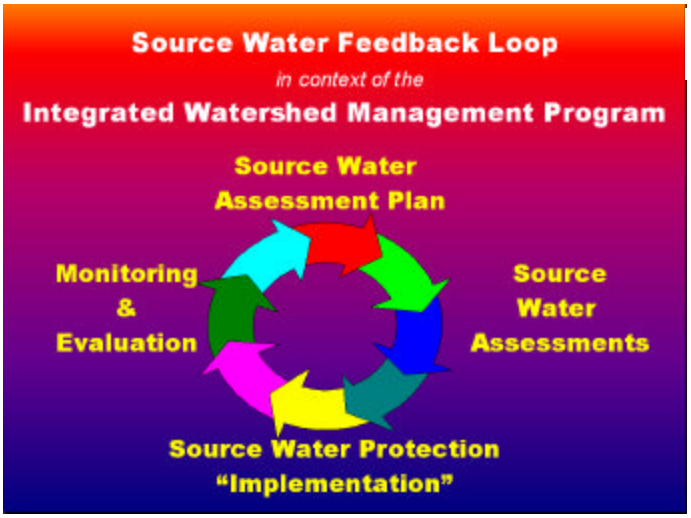

(c)

The TMDL Development Program has been working toward completing the schedule of §303(d) listed streams since the mid-1990's. Over 400 TMDLs have been completed to date, most of which for sediment and total phosphorus and fewer for temperature, bacteria, and metals. Most of these plans have been developed at the 4th field hydrologic unit code. Implementation plans for approved TMDLs are to be completed within 18 months. To date, over 20 of these have been initiated, another 15 are greater than 50% completed, and about 15 are at various stages of less than 50% completed. What this translates into is an ever-growing workload for implementation activities devoted to pollutant load reductions to meet state water quality standards for these approved TMDLs.

Within the framework of the Integrated Watershed Management approach comes opportunities for fostering greater program collaboration. Collaboration has already been occurred with the State Revolving Fund Clean Water Loan Program. The Integrated Priority System Guidance is used today for providing loans for projects with a focus on managing nonpoint source pollution. For example, over $2.6 million was loaned in 2002 for controlling agricultural nonpoint source loads around the state through the Idaho Soil Conservation Commission.

The Source Water Assessment Program is gearing down from several years of effort and a transition has begun toward source water and drinking water protection. The Drinking Water Protection Program is looking to transition toward on-ground implementation activities that best puts the State Revolving Fund set-aside toward drinking water protection activities. The challenge is to be able to both fund full-time protection work in each of the regional offices at least a full-time equivalent, but also provide pass through grant dollars to on-ground implementation activities associated with public water systems. Limitations with set-aside dollars prohibit protection activities on surface water public drinking water systems.

The same parallel analogy can be drawn to source water assessment and protection for ground water quality. The analogy: the statewide groundwater monitoring network -> the Source Water Assessment Plan approved by EPA sets the standard -> insert in place of the TMDL the comparable source water assessment -> for the TMDL implementation plan the comparable regional drinking water protection plan -> post monitoring and evaluation (Figure 1c).

The 1999 Idaho Nonpoint Source Management Plan provides a consistent vision for the State in addressing the whole resource within a watershed framework. In particular, the Plan addresses nonpoint source pollution by implementing BMPs on impaired waters within reasonable time to restore beneficial uses. The NPS Program has generally served three primary roles. (1) As a source of statewide consistency for nonpoint source management (goals, MOUs, guidance etc.) in working with DEQ regional offices, Basin/Watershed Advisory Groups and other special interest groups, state agencies, and governmental entities, among others. (2) Also, providing a blueprint for addressing nonpoint source pollution for all sectors or land uses activities: Agriculture, Mining, Silviculture, Hydrologic/Habitat Modification, Urban Stormwater, Transportation, and Ground Water. (3) Lastly, serving as a voluntary incentive-based grants program encouraging mitigation and prevention for water quality protection and anti-degradation.

The NPS Program responsibilities emerge from the roles described above. Those responsibilities include (1) statewide program objectives, (2) regional program objectives, (3) policy and guidance development, and (4) annual tracking and reporting of all activities to EPA. These responsibilities are executed through program implementation and administration, the competitive granting process, training and outreach, resource and tool development and dissemination (information transfer), and capacity building for integrating activities by way of a watershed framework.

CONCLUSION

The objective with newly created regional office program support positions is to encourage greater program integration between the Idaho 319/Nonpoint Source Management Program and the Idaho Drinking Water Protection Program. This integration across individual program boundaries will ultimately fold into an "integrated watershed management funding strategy," which will provide a consistent vision and application for watershed enhancement projects that are tied into overall watershed implementation plans. That is, projects follow watershed priorities instead of being created piece meal or disconnected from the context of what may be the ultimate problem. Other opportunities where program integration has already been partly achieved is TMDL implementation planning activities. Continued work on achieving program integration takes time and deliberate effort. The first step is introducing the approach and coordinating with all parties the opportunities that can emerge from integrated watershed management.

Table 1. The premise of program integration offers other advantages beyond being more accountable for state and federal allocations. Other benefits to the integrated watershed management approach to joint funding on-ground projects.

One grant process instead of competing. Provide for a consistent application of a voluntary, incentive-based grant program using the existing mechanism of the competitive Idaho 319/NPS Program grant process. Also, one programmatic approach would be used as opposed to two different and competing processes. Primary benefit is encouraging locally-bought in support for project applications and partnerships requiring a 40% local match that is generally tied into a priority setting process. Tracking and reporting would follow the in-place protocol for regional projects. Statewide implementation projects that benefit more than one region simultaneously would still be run by discretion through the individual programs.

Economy of scale. There is an advantage of looking at multiple problems simultaneously at the right scale, deriving solutions that address multi-objectives. The "right" scale is preferably the hydrologic unit code (HUC), but may also be defined on a priority basis (e.g., what scale takes in as many priorities as possible?). Context here is addressing problems created by polluted runoff and pursuing adaptive strategies/solutions that concurrently accomplish multiple objectives. The greatest cost benefit can be achieved by focusing on "measurable benefits to beneficial uses" through multiobjective strategies that address drinking water protection, TMDL load reductions, nonpoint source mitigation, achieving state water quality standards, and functional landscapes in the sense of beneficial uses.

Funding redistribution. Stable federal funding for two years to assist in funding regional office staff reliant on uncertain state general fund appropriations. An evaluation of the first-year work plan outputs would serve as a basis for work plan modification in the second year. Same level of work effort. Provides a way for the state to shift focus toward implementation activities gradually, making a good faith effort that is defendable, lessening the criticism of special interest groups that claim that "not enough is being done." Tracking and reporting to EPA. Each state program has various requirements for tracking and reporting progress generally on an annual basis. We hope that one approach for tracking and reporting can serve as a basis for all these various EPA requirements.