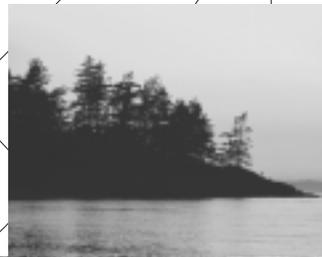


Environmental Results Management Systems:

MOVING FROM PLANNING TO ACTION
BY MEASURING WHAT COUNTS.



A guide for implementation of
results-based management systems
in environmental and natural resource agencies

Imagine a day when ...

1 The agency's goals and objectives are clear and measurable, the environmental measures track progress in achieving the goals and objectives, information management systems are in use to report the measures to a range of audiences for a range of uses, and the measures are being used to regularly inform decisions regarding priorities, program management, and budget allocation.



2 *Managers can plan, do, check, and adapt their work on the basis of results. That is the aim of an Environmental Results Management System (ERMS).*

FAIR WARNING: ERMS is not easy, cheap or a panacea for making tough decisions. You will still need to consider multiple factors in addition to environmental results. But, if you have a serious interest in improving the outcomes and making the connections between your activities and environmental outcomes, then we invite you to read on.

This report is the first product of the ERMS Initiative, a working group of state environmental and natural resource agencies which has formed to share ideas about enhancing the connections between planning objectives, environmental information, agency activities and budgeting. The ERMS Initiative intends for this guide to be the accumulated experience from some of the states that have taken early steps in developing their systems. More information on the ERMS Initiative is located at the end of this report on page 24.

Acknowledgements

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AUGUST 2000

ERMS is a cycle of management activities with no starting or end points. That's good news. It means that we can start improving linkages anywhere along the cycle. You can start improving environmental management wherever you have the most passion, interest or resources.

How to use this Guide

This guide is designed to help you start where you are and make improvements.

Need to better understand short-term outcomes?

Check out the first section on **ERMS Results** on page 3.

Interested in getting your system jump started?

Turn to **Triggering Stories** on page 8.

Considering the construction of a complete system?

You may be interested in the section on **Questions to Ask and Answer** on page 10.

Working on individual pieces of your system such as your planning processes, measurement systems or information technologies?

Try the **Topic** section of interest.

If you read no other section, please turn to our discussion of **Adapting** on page 18.

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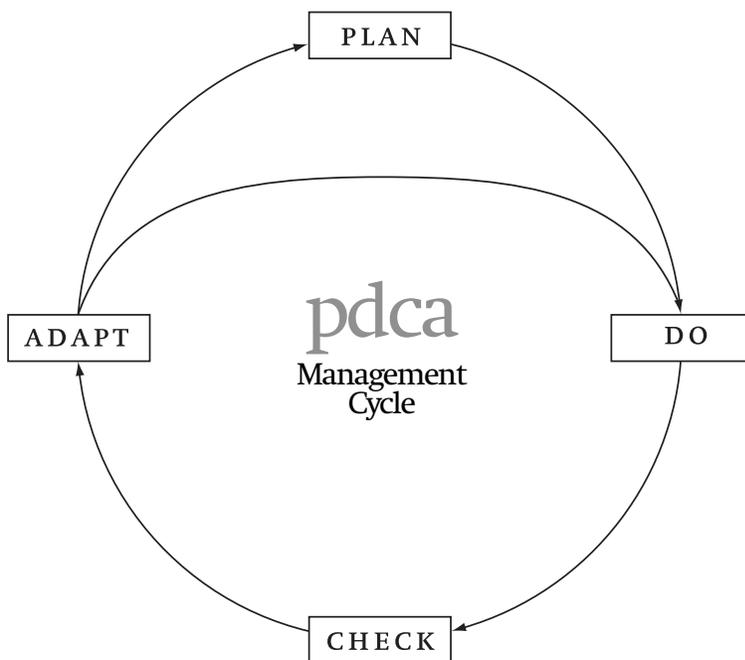
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erms

Environmental Results Management Systems: a range of possible comprehensive management systems which are consistent in their ability to link information about the environment to agency activities. The ERMS Initiative and this guide build on the idea of ERMS to describe how it works and what it does through the use of agency examples.



How ERMS works

For this guide, we use the Plan-Do-Check-Adapt model which includes the following components:

PLAN

The determination of goals and objectives to describe what the agency is to accomplish. While agency planning can include management objectives (such as building staff capacity or constructing an information system), for the work of the ERMS Initiative, we are focusing on environmental objectives or management objectives that can be linked with environmental outcomes.

DO

Actions taken to accomplish the objectives in the planning process. These include issuing permits, testing water samples, and updating rules. As with the Plan steps, Doing within ERMS focuses on the actions of protecting the environment.

CHECK

The review of information resulting from the Do-actions and comparing those results against the objectives laid out in the Plan. This is where performance measures come in.

ADAPT

The link in the chain that identifies the changes necessary to accomplish the objectives in the Plan. The results of adaptation can require re-visiting the Plan (depending upon the planning cycle) or it can feed into the next set of Doable actions.

An ERMS increases the use of information about the environment when making decisions.

ERMS Results Today

... and here's the proof.

ERMS moves agency focus back to the environment

In our discussions with several state agency representatives, a general observation is confirmed that discussing environmental measures is refreshing for managers and staff and leads to informed discussion about future program decisions.

In Oregon, the Hazardous Waste program recently started a pilot project to measure data that made sense to inspectors and legislators. The pilot asks four questions:

1. *How much hazardous waste did you help facilities reduce?*
2. *How much hazardous waste did you help facilities keep out of the dumpster (divert from improper disposal)?*
3. *How much hazardous waste did you help facilities manage more safely?*
4. *Do you have any great stories to tell about how you did this?*

One inspector said, “measuring this kind of thing makes me happy about the work I do.”

ERMS strengthens planning in your agency

Because an important aspect of ERMS is the connection between planning and measurement systems, consideration of new measurement systems and reporting

based on that system, reinforces agency staff connections to agency planning.

The implementation of Minnesota's reorganization, which emphasized better planning, measurement, and a focus on outcomes, has resulted in individual programs focused on their comprehensive management system. The Agency's programs are designing their measurement systems to report to Agency managers on a quarterly basis. Each step in measurement building starts with a reference to the state's Environmental Performance Partnership Agreement with EPA, a central element in their planning process.

ERMS promotes information-based decision making

(and buffers the effects of political influences)

For almost three years, two Secretaries of Florida's DEP (implementing the same system) have held regular meetings discussing results of agency programs based on the quarterly reporting of agency activity and environmental measures. In New Jersey, the Department of Environmental Protection has been using a system of environmental measures for four years to gauge progress toward environmental goals in its Performance Partnership Agreement. A recently initiated reporting system includes regular Environmental Progress briefings to the Senior Management team designed to inform agency priority-setting and decision-making through the use of the measurement system.

These stories are included to show progress that some states have accomplished in pursuing their systems. (Your agency may have other stories that could complement this list.) Our intent is to let you know that the promise of ERMS is real in its practical application and more than an abstract goal theorized by academics.

ERMS Results Tomorrow

... and what it's going to take.

ERMS improves the decisions that environmental and natural resource agencies make by increasing the use of knowledge about the environment.

ERMS builds opportunities for using information about the environment.

Taking advantage of these opportunities is going to take practice and take time. Agency leaders may not be comfortable changing the way that they make decisions by using an information-based system. A robust system of environmental information for use in decision-making will not work if people believe that the system will end up making decisions purely by the numbers and without less quantifiable criteria built on experience and intuition. ERMS needs to build on past decision making processes and provide opportunities for individual programs with managers and staff willing to incorporate environmental information.

ERMS makes room for environmental data together with the gut instinct, experience and political considerations that are already comfortable for decision makers.

ERMS links agency activities to environmental outcomes

Right now, it's hard to prove that issuing more or better permits, or providing more education, enforcement, or technical assistance definitively improves the environment. We need more experience to learn how what we do makes a difference in the environment (cause and effect). We need to practice connecting the intentions behind specific agency actions with environmental conditions – *we are doing program x to affect condition y* – even if the connections back from conditions to our actions are not proven – *condition y changed because of action x*.

The Building of PDCA

A Brief History of Environmental Results Management Systems

In the beginning ... the environment was visibly deteriorating.

Congress passed laws, environmental and natural resource agencies were formed, actions were taken and conditions got better. Thus, the first form of environmental management was born and prospered.

Decide & Do.

Decide and Do is still a dominant model in environmental management and it has certain benefits that are appealing. It is very direct and active. Unfortunately, it also has limitations. Many environmental problems have complex sources and multiple impacts. Planners with management experience introduced many tools to help deal with these complexities: comparative risk assessments, SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, Focus Groups and Strategic Planning. Together, these tools were embraced to build the second environmental management model.

Plan & Do.

Some progress results from instilling planning processes, but one observation is clear: planning is less valuable if you don't measure progress. Therefore, five to ten years ago, agencies added measurement systems to their planning functions. As a result, Self Assessments, State of the Environment Reporting and the National Environmental Performance Partnership System's Core Performance Measures were developed representing progress towards the third environmental management model. **Plan, Do & Check.**

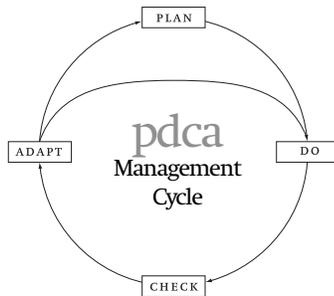
Today, many measurement systems are in place, but again, with mixed success. The common refrain greeting measurement system proponents is that they are not yet used extensively in deliberation or decision making. We are measuring, but not changing what we do. In many ways, the evolution from Decide and Do is not complete because the elements of the planning system are not often fully developed. To complete the planning cycle, adaptive management and deliberation are necessary. **Plan, Do, Check & Adapt.**

The complete system has only recently been tried in state environmental and natural resource agencies using environmental data, but it is not an untested system. Budget making and agency expenditures follow the PDCA cycle. Budgets are proposed and approved (**Plan**). Money is spent on programs (**Do**), regular spending updates show the status of spending rates as it relates to the budget (**Check**) and programs modify their activities (and sometimes their budget) accordingly (**Adapt**). One approach for ERMS is to incorporate environmental information into this existing system.



PDCA at Work *(and in Progress)*

Four stories from state environmental and natural resource agencies



PDCA for Wildlife Management Wisconsin

Like many natural resource and wildlife management agencies, the Wisconsin DNR establishes hunting goals each year for the following season (Plan). Each year, hunters in Wisconsin harvest hundreds of thousands of deer (Do). After the fall harvest, Wisconsin's wildlife specialists and managers review the data on the success of the harvest – how many deer were taken, where they were taken and hunter success rates. Over the following months, wildlife managers also review information on winter kill, crop damage, car-deer accidents, weather and snow cover/depth, and a myriad other data pieces (Check). This information is analyzed to produce an estimate of the herd size that is expected the following fall, and this estimate is specific for numerous deer management units in Wisconsin. These fall herd estimates are compared to the deer herd goals for each management unit, which are based on ecological carrying capacity. All of this information is then presented to senior WDNR managers for their consideration, along with an extensive public-participation process. The final step of this process is to rationally and intuitively decide on the number of licenses that the WDNR should issue in the fall (and whether other special hunting approaches should be permitted) so that the deer herd might be managed to provide sufficient recreational opportunity balanced with the ecosystem's carrying capacity (Adapt). As hunters enter Wisconsin's woods and fields each fall, the doing begins again.

Using PDCA for Compliance Pennsylvania

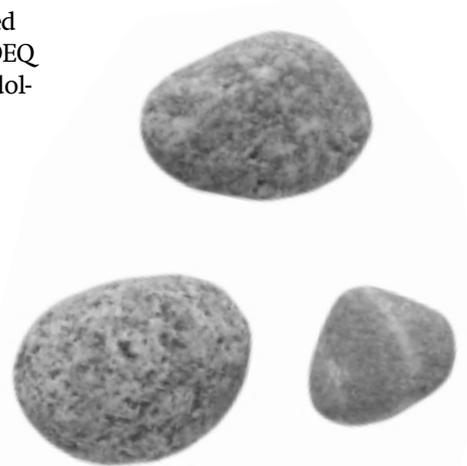
In 1998, 89 Pennsylvania oil and gas well sites showed environmental violations. The most frequently cited violations resulted from earth-moving activities, which require maintenance of erosion controls until reclamation is successful. Pennsylvania DEP's Oil and Gas Management program is responsible for inspecting oil and gas well sites, and underground natural gas storage (Plan). DEP looks at all environmental aspects of oil and gas production, such as erosion and sedimentation controls, pollution prevention and waste management practices, stream encroachments, site restoration, drilling, plugging, record-keeping and public safety issues (Do). In 1999, as a result of its monitoring results, DEP carried out compliance activities and recorded an 11 percent decrease in the number of erosion violations compared to 1998 (Check and Adapt). In 2000, under DEP's Anti Degradation Water Management policy, the Oil and Gas Program expects to recommend and require "best management practices" for erosion control at well sites in exceptional value watersheds (Adapt).

Expanding PDCA to the Regulated Community New Jersey

Another way to achieve the goals and objectives of a state agency ERMS is to offer incentives for the regulated community to adopt similar systems. NJ's Silver and Gold Track Program for Environmental Performance is a voluntary approach to recognize and reward superior environmental performers while encouraging less-than-stellar performers to improve their environmental performance and to participate in the program. This program incorporates NJDEP's strategic goals while establishing prerequisites for going beyond traditional regulatory requirements, such as greenhouse gas emissions reductions and improving water effluent quality through a watershed approach. Participating entities agree to develop Environmental Management Systems (resulting in their own Plan) and are required to report progress in meeting their goals (Check). As has been the case with industry actions after TRI reporting, internally developed decisions to reduce emissions (Adapt) may prove to be at least as effective as DEP-mandated permit conditions, and holds the promise of going beyond reductions achieved through permitting.

On the way to PDCA Budgets in Oregon

Like most state agencies, Oregon DEQ has traditionally constructed budgets within media programs and around specific program activities. Since the 1997 strategic planning process, the media programs have gradually constructed budgets and "operating plans"- work plans with specific allocations of FTE - around Specific, Measurable, Achievable, Realistic, Timed (SMART) objectives rather than just around program activity areas. For example, the Air Quality program houses the FTE for the Vehicle Inspection Program under an objective to "meet or beat health-based standards through 2005." In its recent update to its strategic plan, Oregon established three strategic directions: 1) Involving communities; 2) Cleaning rivers and streams; and 3) Reducing harm from toxics. There are a series of SMART objectives under each of these priorities as well as for our other ongoing work. Before even submitting its budget request, and much to the surprise of people who expected to maintain the status quo, ODEQ shifted fungible general fund dollars across programs to these priorities.



Triggering Stories

Events that helped some states move forward to promote ERMS.

If you are looking for opportunities to promote ERMS in your agency, here are a few triggering events that helped some states move forward.

NEPPS

The National Environmental Performance Partnership System

(NEPPS) has been the single most often cited reason for states to embark on ERMS. While the actual relations between states and EPA have not changed as dramatically towards results-based decision making as some would like, the management systems within states are showing some significant changes. NEPPS resulted in some state programs designing clear environmental objectives, constructing measurement systems, and has influenced reporting systems to review environmental data.

The idea of “results-based management”

At the root of many discussions about ERMS is the communication of ideas about “results-based management” and “reinvention.” NEPPS, individual agency performance management initiatives and some state legislation has the writing of David Osborne (Reinventing Government), or the presentations from Malcolm Sparrow (including a presentation during the 1997 ECOS meeting in Burlington, Vermont) as its foundation. One of the more recent efforts in this arena is the Balanced Scorecard promoted by Robert Kaplan and David Norton. One result from the popular presentation of results-based management is changing expectation of individuals and organizations outside of environmental and natural resource agencies. The clearest evidence is a flourishing set of legislative initia-

tives to establish performance measures and performance-based budgeting. In a few states, this external pressure may be helping agency leadership consider the value of building an ERMS.

Leadership

You knew that the requirement for leadership would arise in a guide about changing management systems. Well, here it is: No new management system thrives solely on the basis of it being “a good idea.” It will take root only if leadership demands change and follows through by paying attention to the process of building the new system. A corollary to leadership is the existence of an internal champion to shepherd the process of change through each step. For every committed commissioner, there needs to be at least one good woman or man in place to see the process through. The qualities of an effective champion are difficult to articulate, but you will know when they are in place. The qualities will include: strong listening and communication skills, likeability, pragmatism, persistence, a tough skin, intelligence, experience, a good understanding of the environment and the ability to occasionally pull a rabbit out of a hat.

NEPPS and Leadership in Oregon

Lang Marsh, the Commissioner of Oregon DEQ has been a leader among state environmental commissioners in seeing through progress on the design of the NEPPS system. In addition to moving forward national level discussion and deliberation on topics such as environmental measures, Commissioner Marsh has pushed his own agency to embrace the philosophy of the NEPPS process. Using NEPPS as a driver, Commissioner Marsh has led Oregon DEQ through two iterations of strategic planning since 1997. The planning process emphasizes establishing clear environmental objectives that are Specific, Measurable, Achievable, Realistic, and Timed for completion. The agency's next step is to build a set of measures which will be integrated into Oregon Benchmarks and the State of the Environment Report.

Leadership and NEPPS in New Jersey

New Jersey DEP's Commissioner Robert C. Shinn, Jr. has provided significant leadership in bringing outcome-based management to the state through his early involvement in the national EPA/State Capacity Steering Committee which developed the NEPPS system in 1995, and his persistent emphasis on the application of the NEPPS results-based management principles in New Jersey. Over the past six years Commissioner Shinn has led the agency through the development of a comprehensive set of environmen-

tal goals, milestones, and measures to serve as the basis for its ERMS.

An Idea Fostered by Leadership in Florida

While Florida DEP Secretary Virginia Wetherell was looking for a way to better report progress on environmental programs, Malcolm Sparrow provided a structure in which to develop measures for that reporting. This 4-tier system became the template for the DEP Secretary's Quarterly Performance Report system.



Our Changing Environment

For 30 years environmental and natural resource agencies have used the authority granted them to address point sources of pollution and easily regulated activities. The success of these should not be forgotten when considering new systems for environmental protection. However, the limitation of command and control

is another lesson learned over the past 30 years. Changing land use, diffuse sources of pollutants and multiple stressors from many adjacent facilities require a new approach. Establishing a new volume of rules and regulations to address the hundreds of conditions representing non-point sources of pollution is not practical. Neither is it politically feasible to seek legal tools affecting private use of property. ERMS establishes a foundation to report environmental trends and agency activities allowing a range of deliberations about the causes of environmental degradation and improvement. The long term result of ERMS is the strengthening of agency skills in assessing environmental programs and their causes. In addition, ERMS may help establish partnerships to address certain environmental issues.

ERMS Q&A

Fundamental considerations to help you clarify the intent of your system.

Is Accountability driving your system?

Whether from agency leadership or from external forces (legislature, governor, interest groups,) a desire to more closely track agency programs with measures of performance may be a driver in your system.

If yes, accountability for outputs or outcomes? Outputs are measures of what agencies do such as the number of permits, the attendance at training sessions and the number of enforcement actions. There is little environmental content to outputs alone, but they do serve as a first step in the development of a comprehensive system. Outcomes are the consequences of outputs such as reduced emissions, increased compliance and reduced impact on ecosystems. Taking credit for outcomes requires evidence of the linkage between output and effects. Because direct cause and effect is often difficult to determine and multiple causes are often connected to any given environmental condition, outcomes are less controllable than outputs and thus may be the source of anxiety for people who work with performance measurement systems.

Therefore, the short answer is that accountability for outputs provides a stepping stone to accountability for outcomes and the resulting shift of emphasis towards environmental measures.

Want more on accountability?

Look for the Accountability icon in the Topics section of this guide.



Is your ERMS to provide strategic direction for your agency?

Strategic direction for your agency is the focus on specific categories of environmental impacts, certain media, certain regulated sectors, certain management approaches or geographic areas in your jurisdiction. Providing strategic direction can also include the establishment of specific environmental goals or milestones.

If yes, systems with a strategic focus provide policy direction and answer the question: “How do we intend to accomplish an environmental outcome?” These systems have a primary emphasis on environmental measures and tend towards long term policy decisions. Note the difference between these kinds of policy questions and measures with the output-oriented measures for accountability systems.

Is linkage to the budget an important aim for your system?

For ERMS, linkage to the budget means that budget decisions are informed by a presentation of measures of progress towards environmental objectives. It may also mean that budget structures and dollars are constructed to support strategic directions.

If yes, the ERMS Initiative has not yet developed many examples where results-based systems have been applied to budget-making decisions. Some states tie budget or grant development to strategic directions

and most of the states are building toward tying results to budget formulation. An ERMS focused budget has the benefits and challenges of working within an already well-established decision making process. To incorporate the benefits and overcome the challenges, you may consider an incremental approach building upon your existing system. One of the requirements is to structure your planning and measurement system in a way that reflects your budget system.

Is it your intent to develop information for public communication or public involvement?

If yes, public communication is a different objective for ERMS than management support and requires different considerations. There will be elements of the planning, measurement and adaptive deliberations that will be useful for public involvement, but this guide is not intended to address those needs. Most of the examples in this guide are based on systems that have public involvement as a secondary objective.

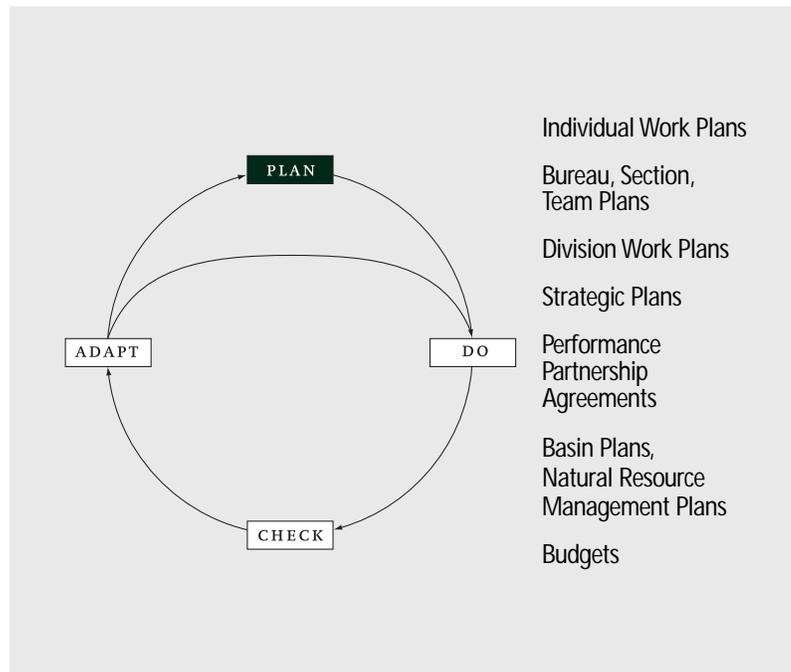
Topics/Planning Systems

Your planning system

Planning is more than a first step in a PDCA management cycle. The goals and objectives of a plan provide a structure for an agency's actions (Do). That structure can be used to help organize the measurement system (Check) and the goals and objectives provide concrete endpoints for program evaluation and fine-tuning (Adapt).

Key points:

- Build measurable objectives
- Decide who is going to participate and who is going to be affected in doing the plan
- Different decisions, different levels of planning
- Remember the other pieces of an ERMS



Measurable objectives

Measurable objectives are a cornerstone to ERMS. Measurable objectives provide the content for measurement systems and a specific agenda for discussions about adapting agency activities. In an informal survey of several state environmental and natural resource agencies with strategic plans, a large number of the objectives in those plans were not readily measurable. For example, "Protecting rivers and lakes to ensure a healthy environment" may be a laudable objective, and the deliberations to arrive at that objective may help agency staff focus their attention on environmental outcomes. Unfortunately, the objective is difficult to measure and in the context of an Environmental Results Management System, objectives such as this do not promote meaningful discussion about the progress of the agency in implementing its strategies.

Measurable objectives are even more useful when they include specific targets. The ERMS Initiative participants recognize the

SAMPLE OBJECTIVES FROM STATE STRATEGIC PLANS

Measurable objectives

- Reduce the generation of municipal solid waste to # million tons per year
- By June 30, 200X the total number of waterbodies on the state's "A" and "F" 303(d) lists will be reduced Y% from 19ZZ baseline.
- Implement methane gas controls at all closed landfills which have methane gas problems by 2005.
- Reduce SO₂ emissions from electric utilities 50% from 1980 levels by 2000.
- 3.5% reduction of greenhouse gas emissions from 1990 levels by the year 2005.

Difficult to measure objectives

- Integrate program tools to affect behavior that will encourage the purchase of less packaging.
- Protect and enhance rivers, lakes, wetlands, and ground water to ensure a healthy environment
- Closely monitor air sources. Obtain, compile and review for accuracy air emissions data from air sources.
- Protect and restore critical habitat in the X basin.
- Reduce the potential for pesticide contamination of water in the state.

political and practical challenges of setting targets such as “a 10% reduction of vehicle miles travelled by the year 2005” (in contrast to a measurable but not targeted “reduction in vehicle miles traveled.) Despite these challenges, the Initiative members recommend that agencies push to include targets in the development of their objectives.

Different Decisions – Different levels of planning

Each of the following is a legitimate (and measurable) planning objective

- Restore x miles of habitat in a watershed
- Reduce nonpoint sources of pollution to a river
- Educate 1,000 farmers about manure management technologies
- Use 0.5 FTE to develop curriculum for a farmer education program

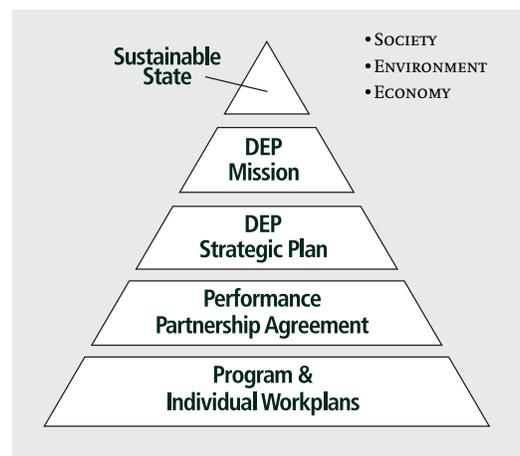
Each of these objectives can be a part of a management system if the objectives are accompanied by work plans, the results measured, and those measures are part of deliberations on the success of management activities and strategies. Each objective has a different time frame for completion, different audiences for implementation and a different sequence of events necessary to translate it into action. And, each objective in this example forms a linked set.

A comprehensive management system may include each level of decision in different levels of planning much like the layers of an onion. Agency leadership may establish broader, long term objectives, while program managers may decide upon the strategy and the resulting shorter term objectives. Even in the absence of a comprehensive system, a clear recognition of where your plan resides within the onion layers in your agency is important when considering your measurement system, your audience, and

your opportunities to adapt strategies and activities. (See the section on Adapting, page 18 for a further discussion.)

New Jersey’s Results-Based Management System

Since 1995, NJDEP has expanded its integrated environmental management planning efforts, including the development of goals and measurable objectives. At this time, NJ’s overall ERMS is conducted within a hierarchy of plans for environmental protection ranging from a statewide sustainable state plan, down through a 4-year Strategic Plan and a 2-year Performance Partnership Agreement, down to individual program and staff work plans (see figure below)



Multiple layers of Planning in Minnesota

The Minnesota Pollution Control Agency (PCA) started using its Environmental Performance Partnership Agreement with EPA (EnPPA) as its primary agency planning document in 1996. The EnPPA was used to help focus PCA on environmental outcomes that are to be achieved through many of its activities. Since that time, the agency has developed more complementary planning tools that place the right type of planning at the right level of the organization. For exam-

ple, PCA has a 5-year Strategic Plan which will be connected to more detailed, descriptive and shorter term division workplans which are connected to even more detailed individual workplans.

The EnPPA is used to focus the agency on environmental outcomes. While maturing, the integrated planning system is still being modified so that the different levels of plans are used effectively in the ERMS. The ultimate intent is to describe a clear environmental direction and link the agency's activities to that direction without overburdening staff with excessive and unnecessary planning.

Participation in the plan development

One complaint about agency planning is that planning staff develop the plan and an entirely different corps of staff is expected to implement the directions. Fuller participation in Agency planning is important to ensure that the measurement system and reporting of results fit into an overall strategy of using environmental information.

Accountability

For accountability systems, make sure you have the people who collect the data, the people from whom you collect the data, and the people who use the data involved in the same process.

Remember the other pieces of ERMS

Most state environmental and natural resource agencies have planning processes yet few agencies are satisfied with their track record in implementing those plans. ERMS enhances planning by integrating the planning structure with the agency's activities, and its measurement and reporting systems.

What it takes/What it gets you

What it takes

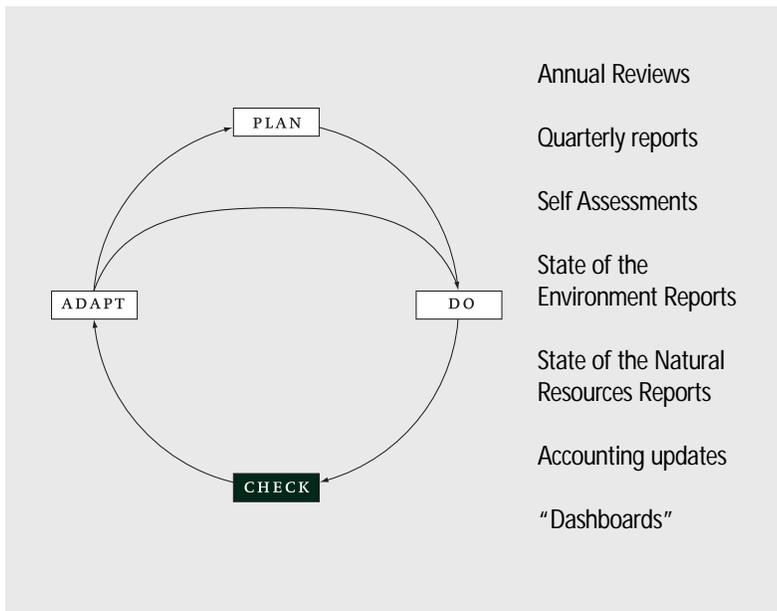
Drafting management plans requires staff time and a structure that allows connections between agency activities and environmental effects.

What differentiates a good plan from a dust collecting feel-good document is not just the content of the plan, but the commitment to connect the plan to agency activities through measurement systems and adaptive mechanisms.

What it gets you

A management plan and the effort necessary to craft it provides an opportunity for staff to make the connections between their efforts and the intended direction for the agency. With the incorporation of other elements of a management system (as described in this guide) a comprehensive set of plans provides benefit for the agency in accomplishing its mission of environmental protection.

Topics/Measurement Systems



for your ERMS. However, we do feel it is important to establish a structure to categorize your measures. Measurement structures used by ERMS Initiative states include Pressure-State-Response; environmental measures-behavior changes-agency activities-budget; and the Chesapeake Bay Program 6-tier system.

The application of measurement structures helps make clear the linkage between different kinds of measures which are used for different functions within your agency. Budget measures are regularly used to track spending rates and match against budgetary allocations. Activity measures provide information on the effort expended and the outputs resulting from Agency staff work. Behavioral or response measures report the level of compliance with regulations, the incorporation of new technologies and the overall changes in activities that may result in environmental degradation or environmental protection services. More detailed measurement structures include a range of environmental measures. These include emission rates or other stressor levels, ambient conditions, exposures and environmental effects.

Your Measurement System

Measurement systems reflect both changes in environmental conditions and the efforts of the agency to enhance the environment. If agencies are going to base their management on results, they have to measure progress towards those results.

Key points:

- A structure is important (although the particular structure selected is not critical)
- Sets of measures are required to manage
- Connect the measures to the plan
- Don't forget the environment

Measurement Structure

Measurement structures are the classification and connection of different types of measures. The most basic structure links output measures with outcome measures. This guide will not recommend a particular system of measures that is most appropriate

Sets of measures are necessary to manage

Linking measures of agency activities through behavioral or response measures to environmental measures makes more explicit the connections which often serve as the basis for environmental management strategies.

Without an explicit set of links, there is a range of interpretations possible regarding trends in single measures. For example, a measure showing increases in ambient concentrations for pollutants might suggest a relaxation of permits or an increase in non-regulated air emissions. Additional, linked measures that provide an indication in the

Connect the measures to the plan

ERMS is based on measurable goals, objectives and strategies or activities. The primary benefits of connecting planning and measurement are to build an information base that directly supports the evaluation and discussion of agency progress towards achievement of goals and objectives. A secondary benefit is that reference to goals and objectives in measurement systems reinforces those goals and objectives thereby strengthening the utility of the plan. Connecting measures to the plan also allows for the development of measurable objectives as measures of current conditions to provide baseline values for these objectives.

EXAMPLE OF LINKED MEASURES

Agency Activities	Trends in Behaviors	Trends in Emission	Trends in Ambient Conditions	Effects
Acres under Nutrient Management		Non-Point Source Loads	Concentrations of Nitrogen in the Bay	Dissolved Oxygen

Taken from Chesapeake Bay Program

trends of regulated or non-regulated emissions will provide more clarity with respect to the effectiveness of a permitting program (or a program to address non-regulated activities.)

The most robust use of a measurement system is the Chesapeake Bay Program application. The CBP 6-tier framework implies connections between behavior changes and emission levels, emission levels and ambient conditions, and ambient conditions and environmental endpoints. The presentation of data regarding nutrient loading into the bay fairly consistently reports the linkage of different source loadings with ambient bay nutrient conditions.

These examples may appear obvious but the frequently exercised alternative is to develop objectives that have no connection to existing measures. In this latter case, the ability for agencies to complete a results-based deliberation, and adapt their programs is severely hampered and may be a significant cause for the failure of such systems to thrive.

EXAMPLES OF LINKED MEASURES & OBJECTIVES

For this report, GMI reviewed several state environmental agency planning and measurement reporting systems. As the result of ERMS Initiative discussions, we looked for explicit connections between environmental and/or program measures with planning objectives and/or strategies

From the documents that we reviewed, there are a few cases where the connections are clear. In these cases, measures share the same language as the objectives.

Objectives

Measures

Increase the number of acres by x% from yy baseline of public land designated for native species protection.

The number of acres of land designated for native species protection.

Increase the population by ## of communities that receives drinking water meeting all health based standards

The population receiving drinking water that meets all health based standards.

Increase the number of tons of solid waste diverted from landfills or incinerators via recycling, reduction or reuse from yy baseline.

Number of tons diverted from landfills or incinerators via recycling reduction or reuse.

Measuring the environment

A common conclusion from researchers looking at environmental measurement systems is the general lack of measures that reflect environmental conditions. This guide joins their chorus encouraging the greater development of environmental measures and less emphasis on measuring activity ‘beans’. However, the responsibility for increasing the number of environmental measures is not just in the hands of those charged with developing performance measures. The measures are a part of an overall ERMS and, therefore, the responsibility for environmental measures belongs to the entire agency in implementing an ERMS. Environmental objectives within your plan will require environmental measures and developing these measures will allow for discussing environmental conditions during your “Adaptation” exercises.

“Beans” as part of Sound Management Nutrition

None of the participants in the ERMS Initiative suggest that “throwing out the beans” is the answer to reversing the current emphasis on reporting activity measures. Good measurement systems are like a balanced diet. Beans (output measures) are good for you but carbohydrates, vegetables, protein sources and a little fat are required for a healthy body – and maybe some chocolate keeps you coming to the table. Activity measures, behavioral measures, budgetary measures and environmental measures are necessary for a functional measurement system – and an occasional Bernie Fowler Sneaker Index of water quality keeps you coming back to the conference room. (Bernie Fowler is a popular citizen of the Chesapeake Bay and acts as a human Secchi disk once per year.)

Accountability

Remembering the discussion on page 10 about output and outcome accountability, your measurement system can support your accountability system. Once the measures are chosen, the act of compiling data to report for accountability will initiate changes in program behavior.

A different twist to accountability has been applied in states such as New Jersey where managers are given the responsibility to make sure that the measures are reported. Assigning this responsibility has been important to ensure that measures are reported and foster the implementation of the NJ ERMS.

What it takes/What it gets you

What it takes

Environmental measurement systems require a commitment to ERMS. Building a measurement system without a clear intent for its use within the agency is an almost certain path for the development of an obsolete and withering measurement system.

A commitment is necessary that at least some agency decisions will focus on better environmental results if those decisions can be informed by trends in agency activities and resulting outcomes. This commitment may require greater resources for monitoring, for assessment of environmental data, for information technologies, for staff training and for the long-term incorporation of adaptation mechanisms. The commitment may also require swallowing a little institutional pride by reporting past results with the possibility that not all past decisions yielded the best possible environmental results.

What it gets you

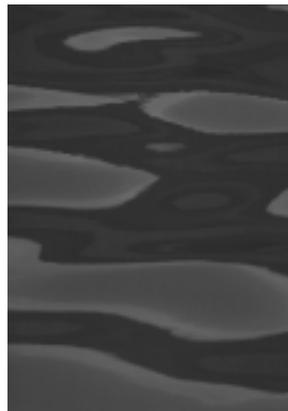
As with planning, the development of the measurement system, even before the first report, builds the capacity of participating staff to connect their actions with environmental outcomes. The implementation of the first report reinforces the learning that takes place in building the system. Continued reporting continually reinforces the learning.

In addition to staff learning, a robust measurement system will help you provide better answers to questions regarding the core mission for environmental and natural resource agencies.

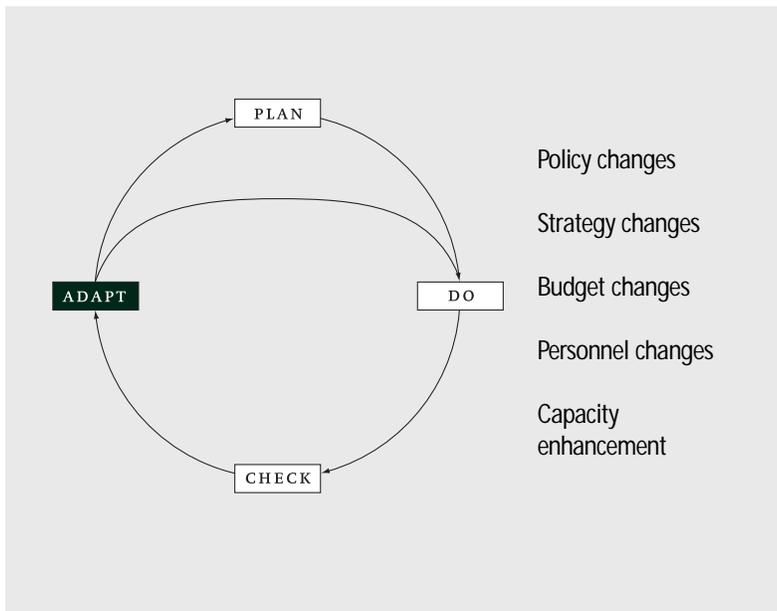
*Is my water safe to drink and to swim in?
(And are agency actions continuing to improve conditions?)*

*Is the air safe to breathe?
(And are agency actions continuing to improve conditions?)*

*Is the condition of our forests, grasslands
and deserts sufficient to support a
healthy ecosystem?
(And are agency actions continuing to improve conditions?)*



Topics/Adapting



This guide emphasizes a new step for traditional planning processes.

Adapting results from the review of measures reflecting agency actions and environmental changes. Unlike most other components of ERMS, there is limited experience in designing and carrying out adaptive deliberations. A focus of the continuing work of the ERMS Initiative will be on effective adaptive management mechanisms.

Key Points

- Key to success
- Consider your intent carefully
- You are on untested ground

Key to Success

You have found the key to a successful ERMS. Designing and implementing adaptive approaches based on reported information from trends in environmental conditions and agency activities will result in the use of the information generated in your system.

Consider your intent carefully

There are a range of deliberations possible. Much of this range is described by the decisions you plan to affect and the measures that you have chosen. Strategic deliberations focus on long term decisions and measures reflect slowly changing environmental conditions. Program management deliberations focus on the implementation of strategies which may or may not cause short term changes in environmental stressors. Activity management deliberation focuses on program outputs such as permits training and enforcement. The time frame, participation and the measures considered will vary under these different scenarios.



DIFFERENT LEVELS OF DECISIONS, DIFFERENT TYPES OF DELIBERATION

	Activity Management	Program Management	Strategic Direction
Example	Idaho DEP	New Jersey DEP Progress Briefings*	Chesapeake Bay Program
Planning Cycle	1 month to 1 year	1-2 years	5 years to 15 years
Agency Audience	Staff and supervisors	Agency Leadership and Division Directors	Agency leadership
External Audiences	None	Advisory Boards	General stakeholder involvement
Types of Measures	Budget and Activity measures	Environmental outcomes, pressures contributing to environmental problems and activities	Environmental outcomes and broad categories of pressures and budget
Goals and Objectives	Activity objectives and performance quotas	Environmental objectives (such as emission reductions, air quality)	Societal goals for environmental protection
Questions Answered	How many \$ and FTE are we using to carry out each activity?	How much reduction in a stressor is taking place? Are environmental goals being achieved?	How bad is the problem?
More Questions Answered	How much of the activity are we accomplishing?	What is our relative level of effort for different strategies (permitting, technical assist) and is it going to achieve our goals?	What are the primary causes? How much are we spending?
Example Measures	FTE on inspections, # of inspections FTE on training, # attending training, evaluation of training	Emissions of CO from regulated point source Compliance rate for regulated point source Emissions of CO from mobile sources Volume of travel (VMT) Relative agency effort on point source and mobile sources	Number of days exceeding the CO standard Geographic location of exceedances Relative contribution of point source and mobile source contribution Agency expenditures on addressing CO emissions
*NJDEP Strategic Planning includes elements of both Program Management and Strategic Direction.			

Detailing your intent

A well structured adaptive deliberation will draw specific connections between objectives and levels of effort designed to accomplish those objectives. Then, depending upon the intent of the adaptive mechanism, the discussion question can either be:

Do we have any information that suggests an alternative approach to accomplishing our objective more effectively?

Or, Have our existing efforts been effective in accomplishing adequate progress towards the objective?

The subtle difference in these questions reflects an overall tone for your ERMS. In the first case, the adaptive discussion will tend towards constructive suggestions and inquiries into program modification. In the second case, there is the implied finger pointing towards failed programs and less effective program managers. While the specific wording of the questions may not, in

itself, provide differentiation of these two adaptive mechanisms, the difference in tone of the discussions is important to recognize.

Untested ground and a key linkage

There are only a few examples in environmental and natural resource agencies of deliberations structured around environmental measurement systems. The ERMS Initiative has not yet resolved all of the difficulties in implementing adaptive deliberations, but the lack of structured measurement systems is an important factor as well as the complexity in linking activities to environmental outcomes. Not coincidentally, exercising adaptive deliberation may be an important step for ensuring viable measurement systems. In fact, matching structured measurement systems and adaptive deliberation may be the key to long term utility of results-based management systems. In appropriate time cycles (as represented in the table above) the review of environmental information will strengthen its creation and long term vitality.

Adaptive deliberation for Accountability

This guide differentiates output and outcome accountability. Adaptive deliberation related to outputs usually focuses on input measures as they relate to outputs. A typical result from output deliberation will be the assignment of greater resources or staff capacity building. The results of outcome deliberations are more interesting from a policy perspective. The choice of strategic direction and program design imply connections between outputs/strategies and outcomes. Failure to meet the outcome may be the result of failure to execute the program (and will be reflected in output measures) or it may be the result of incorrect implied cause and effect connections, including the

influence of unidentified factors external to the program's influence. As with many policy and assessment tools, the multiple factors necessary for making a decision are difficult to capture in an ERMS measurement system.

What it takes

It is the opinion of the ERMS Initiative members that pursuing adaptive deliberation is a minor investment of time compared with the development of a plan, the construction of an information measurement system, and the reporting of results. One of the messages from the ERMS Initiative participants is promoting the development of adaptive deliberations provides the best opportunity for utilizing the information that is painstakingly developed for ERMS.

We do not pretend that the implementation of adaptive deliberation is easy. But the major challenge in implementing the system is more the will to use information in decision-making rather than one of labor intensive data collection or capital intensive information technologies.

What it gets you

To the extent that your deliberative process utilizes the measurement system and planning structure, you will be sending a message that your ERMS components are valuable. Whether or not specific decisions arise, the staff and managers will practice using environmental information and practice applying their work to a planning framework. The use of common data and common planning structures build a stronger partnership among agency staff.

Topics/Information Technologies

What is Information Technology?

(from an ERMS perspective)

Information technology need not be a secret language of the computer-friendly associates within your agency. In fact, you should be seeking a more precise and understandable definition of information technology from those in your agency promoting its development. Different people will have different ideas and pursuing IT without a common understanding will make it difficult to build a useful system.

For this guide on ERMS, the term, “Information Technology,” includes the computer hardware, software, and agency operating protocols that allow for the input of data corresponding to your measurement system, the storage of that data and the retrieval of that data in the form of useful information.

Information technology is not a component of an ERMS as are the planning, measurement and adaptive management components. Rather IT is a tool to help move information between individuals and organizations. This does not downplay the importance of IT. Trends in greater computational power, managing various types of information (words, pictures, numbers, maps) and the easier distribution of this information is creating powerful opportunities for achieving better results in environmental and natural resource agencies.

Key points

- Develop communication between the information users and the IT architects
- The purpose of IT is to make it easier to develop and use environmental information to achieve environmental results
- Data compatibility is a central starting point for many IT discussions

Develop communication between the users and the architects

Information Technology consultants will interview potential users to construct new systems. Unfortunately, the translation of semi-informed responses to the construction of a technology-based information management system is not simple. IT can be intimidating to those who have not kept up with changing computer technology. However, it is important for all users, not just the new generation of mouse-friendly practitioners, to be comfortable with the input and/or retrieval of information from the system. The challenge is to provide a review process that gives users a chance to test prototype systems under real conditions before the final system is in place and the expectation for use blossoms (or wilts). Some organizations have dysfunctional information technologies as the result of system construction out-pacing the needs or understanding of the user.

The purpose of IT is to make it easier to develop and use environmental information

Sophisticated technologies can process and manage vast amounts of data. Combining Geographic Information System (GIS) technologies, modeling algorithms and merging data bases provides a lot of “gee-whiz” output. Unfortunately, there are few decision processes within environmental and natural resource agencies that can take advantage of the sophisticated technology and sometimes, the technology is developed before fully considering how the information will be used. Choosing an appropriate information technology is a fine balance between choosing a fascinating potential and a practical future.

OPTIONS TO CONSIDER FOR DESIGNING YOUR INFORMATION TECHNOLOGY PLAN

The following are some examples of actions that states have initiated in order to establish an outcome-oriented, integrated strategic information management process:

- The appointment of a senior management level Chief Information Officer (CIO) tasked with carrying out the global view of information needs through an Information Technology Strategic Plan for the agency.
- The establishment of Information Technology Councils to service the CIO and the agency in direction setting and accomplish the agency's Strategic Plan and the resulting action plans. Council members represent major mission areas and help identify outcome-based measures of accomplishment, assure that the baseline against which performance is measured is clear, and assess the contributions of information systems to standardized approaches by all regulated programs entering data into information systems so that analysis and trends can be determined.
- The establishment of Change Review Boards for major information systems that decides implementation of enhancements as a result of changing strategic priorities, modifications in activities or changes resulting from improved work processes.
- The establishment of Information System Policy Boards for assurance of standardized data input and use of information systems to ensure an agency's ability to compare and analyze data coming from the system.

Data compatibility is a practical starting point

Many states' first effort with IT is to build a single system that allows for sharing of information between previously independent systems. The challenge that these projects have overcome is the compatibility of differing data sets. Data standards are taking root in many environmental and natural resource agencies. Because so many states have tackled the data standards issue, environmental and natural resource agencies entering the IT arena may be able to learn from the experiences of others.

What it takes

IT development may be the most expensive piece of your ERMS, at least in terms of budget dollars. Most states require external contractors to establish a functional information technology system and several million dollars may be necessary. Besides committing financial resources, the integration of IT development with the overall development of an ERMS is the foundation of this guide, but not easily implemented. This integration will be a next step for the ERMS Initiative.

What it gets you

Consolidating data from different sources provides an opportunity to initiate a network among those sources.

Combining different types of data opens up new possibilities for analysis of complex problems.

Keeping all the data online and accessible makes it easier for agency staff to grow comfortable with data use.

Integrating different information systems reduces confusion and wasted resources.

A coordinated IT development program will require Assessing the quality of data and will result in separating misleading data from core trend information.

PARTNRS in Wisconsin

The Wisconsin DNR, over the past year, has increased its ERMS capabilities through stronger planning, a greater emphasis on developing and using performance measures, and then reporting on these measures, for example, through its first State of the Natural Resources report.

These pieces and the links between them are still maturing. One significant aspect of this effort involved the creation of a graphical, easy-to-use and easy-to-implement information management system using existing IT tools. This system is the WDNR's Performance And Results Tool for Natural ResourceS or PARTNRS. This system allows any employee to view different outcome and output performance measures (more than one hundred, and growing) as a form of an email message called a "post item." Along with the graphics, supporting text explains the information as well as who is responsible for preparing the measure.

The graphic in the post item is linked to a secure spreadsheet file elsewhere in the WDNR's central computer system. Staff can readily link into the graphic and data so that they can copy the data, manipulate the data or graph for their own purposes in a new file, and use the data and graphics for other forms of reporting. And, in the form of an email message, the post item may be readily sent to other email recipients as appropriate. The utility and use of this system is expected to significantly increase now that the agency recently finalized its planning objectives, and future monitoring and reporting will be required through the PARTNRS system.

OPTIONS TO CONSIDER FOR THE PRODUCT OF YOUR IT

- Geographic Information Systems (GIS) for displaying the data spatially
- Data warehouses where viewable data can be pulled from across multiple information systems
- Ad hoc query tools for displaying a variety of charts, graphs and models
- Advanced software tools for providing the ability to play "what if" scenarios
- Innovative electronic commerce initiatives to eliminate time delays, redundant data entry and paper consumption
- Metadata standards to facilitate searching of environmental data by staff, the public and agency partners
- Internet use and electronic data transfer for partner data sharing and public access
- Data management tools to acquire, estimate, convert, validate and analyze data



An invitation to join the ERMS Initiative

The ERMS Initiative is interested in your participation as we move into the next phase of our work. This guide is an initial short term product in response to a request made during the December meeting of EPA and the states to review progress of the National Environmental Performance Partnership System (NEPPS).

One important driving force behind the initiative was the need to re-build a national network of state environmental management practitioners. During the early 1990s such a network existed and was supported by EPA's Regional and State Planning Division. That Division no longer exists and its function (support state collaborative assessment and measuring processes) has not been picked up by other parts of EPA. In the absence of EPA support (hopefully temporary), the ERMS Initiative states have supported this effort with our own resources.

We recognize that we do not represent all of the states and therefore, do not represent all of the best practices in implementing ERMS. We came together on a volunteer basis, largely to share experiences so that we could return to our own state agencies and consider how best to move our systems forward with the lessons learned from each other. There are still several issues that we wish to explore in more depth. There are also some strategies for implementing our systems that we would like to develop jointly. We hope that you find this guide useful and will consider joining the ERMS Initiative for its next phase of work. If you are interested, we encourage you to contact any of the Initiative members or the Green Mountain Institute for Environmental Democracy, which has staffed the effort.

Best regards for your ERMS effort. We wish you luck and environmental success.

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