

**US-Mexico Border 2012 Program:
Strategy for Indicator Development**

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I. INTRODUCTION

Border 2012 is a binational environmental program managed by the U.S. Environmental Protection Agency (USEPA) and Mexico’s Secretariat of Environment and Natural Resources (SEMARNAT). Its mission is to “protect the environment and public health in the U.S.-Mexico border region, consistent with the principles of sustainable development.” Possessing adequate information is essential to protecting the environment and public health; recognizing this, the National Coordinators of the Border 2012 program agreed to “measure program progress through development of environmental and public health-based indicators,” “achieve concrete, measurable results” and “strengthen capacity of local community residents and other stakeholders to manage environmental and environmentally-related public health issues.”¹ The purpose of this strategic document is to provide a foundation for the identification, development, and use of a basic set of indicators for the Border 2012 program.

These indicators will provide accurate information regarding the state of the environment and human health along the US-Mexico border, thus creating a basis for comparing changes in the environment to changes in public health. The indicators should also help to monitor the effectiveness of the activities of the US-Mexico Border 2012 program and measure progress toward achieving its goals and objectives. Collectively, indicators will provide information that both policy-makers and the public can understand, forming a basis for making well informed decisions.

This strategic document provides context for border indicators and facilitates cooperative work between all stakeholders and entities of Border 2012, particularly by fostering communication between and within the binational regional workgroups, taskforces, and policy fora. Much work has already been completed on indicators and environmental health issues in the border region; however, too many of these efforts are isolated. It is important to build upon pre-existing relationships and investments, and integrate with previous indicators work in a deliberate and purposeful manner, specifically addressing the local communities that are the target audience of Border 2012. Ultimately, all stakeholders will benefit from developing and maintaining sound indicators that are applicable binationally.

¹ “Border 2012 Framework: US-Mexico Border Environmental Program”
Available at: http://www.epa.gov/usmexicoborder/pdf/2012_english.pdf p.3

II. BACKGROUND

The U.S.-Mexico border region is characterized by conditions that could contribute to further decline of the environment and health of border communities. Projected population and economic growth has resulted in unplanned development, greater demand for land and energy, traffic congestion, increased waste generation, and overburdened or unavailable waste treatment and disposal facilities.² There is evidence that documents the relationship between these environmental conditions and health problems in border residents, including waterborne and respiratory diseases.³ Such situations pose a challenge to the development of environmental and health infrastructure and capacities to effectively manage these issues at the local and regional levels.

Since the 1983 La Paz agreement, the United States and Mexico governments have undertaken cooperative initiatives implemented through multi-year binational programs. Border XXI preceded the Border 2012 program and marked the first binational attempt to develop environmental indicators for the border region, making tangible contributions to understanding the quality of the environment and its likely impact on public health. The revised Border 2012 agreement sets goals and objectives through the year 2012 to be accomplished by regionally-focused workgroups and media or issue-specific task forces. This program emphasizes a bottom-up approach and includes local decision-making, priority-setting, and project implementation. The Border 2012 goals encompass aspects of air, water, and land contamination; environmental health; chemical exposure via accidental release and terrorism; and compliance, enforcement and environmental stewardship.

The Border 2012 program also mandates that indicators be developed and used to demonstrate real, meaningful, and measurable results. In order to ensure that these goals are met and to increase overall capacity to respond to environmental and health problems at the border, the Border Indicators Task Force (BITF) was established in December 2003. The role of BITF is to coordinate with all Border 2012 groups and stakeholders in order to define a set of indicators as well as develop protocols for the collection, analysis, and quality control of the data necessary for the calculation and interpretation of those indicators. Ongoing review of indicators will provide partners and decision-makers with an informative tool that can help shape research and public health and environmental public policy priorities.

Various stakeholders will be involved in the development and use of indicators. In addition to the federal environmental agencies - the USEPA and SEMARNAT - federal health agencies such as the US Department of Health and Human Services, in particular its Centers for Disease Control and Prevention (CDC), and the Mexican Secretariat of Health (Secretaría de Salud) participate in the Border 2012 program. The state and local health and environmental departments on both sides of the border are also key players in this process, as well as non-governmental

² “Border 2012 Framework: US-Mexico Border Environmental Program”

Available at: http://www.epa.gov/usmexicoborder/pdf/2012_english.pdf

³ “Exhaled Nitric Oxide in Asthmatic Children and Traffic Density in the US-Mexico Border: Preliminary Results from the EVA Study (Vehicular Emissions and Asthma)”
F. Holguin et al

organizations such as the Pan American Health Organization (PAHO) and the Southwest Center for Environmental Research and Policy (SCERP).

III. CONCEPTUAL FRAMEWORK FOR US–MEXICO BORDER 2012 INDICATORS

Consistent with worldwide trends, interest in US-Mexico border indicators started increasing in the mid-1990s. Many international organizations (including the United Nations Environment Program (UNEP), the World Health Organization (WHO), and the Organization for Economic Cooperation and Development (OECD)), federal and state governments of countries across the world, as well as non-governmental organizations use indicators to monitor their programs, plan their next actions, and track trends. Overall, indicators serve three main functions:

1. Provide information on the system or process in an understandable way;
2. Evaluate the effect of performed policy actions and plans;
3. Assist in highlighting data gaps, and then translating collected data into policy relevant information⁴

Indicators become useful, informative tools when they are related to a conceptual framework that holistically describes the interactions within a system. A conceptual framework will concretely aid the Border 2012 program by giving it several characteristics, including⁵:

- Transparency of program strategy and goals
- Consensus and improved communication and participation of stakeholders
- Flexible, dynamic process design that is able to absorb new information
- Systems-approach to complex problems strengthening capacity of stakeholders to manage environmental and environmentally-related public health issues
- Systematic way to conceptualize information from many different sources

In the Border XXI program, the **Pressure-State-Response (PSR)** conceptual framework was used to conduct indicators work.⁶ This primarily linear model follows the logic that a Pressure causes a change in State, which then evokes a societal Response. However, the PSR framework is limited in its application; it does not account for the complex ecological processes and human-environment interactions. More specifically, it provides no explanation for impacts that may result from changes in State, nor does it provide a means for Responses to affect the system in a dynamic, cyclical manner. The priorities of the Border 2012 program require a more comprehensive conceptual framework that will account for outcomes within the system.

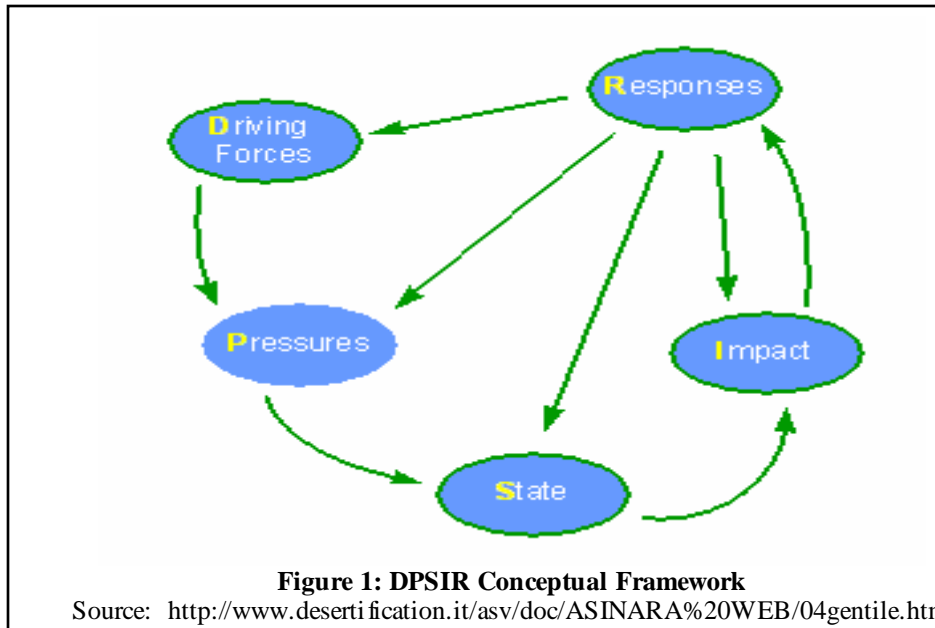
The **Driving Forces-Pressure-State-Impact-Response (DPSIR)** conceptual framework is an extension of the PSR model resulting more suitable for Border 2012 needs. It is also based on the idea that anthropogenic activities impact the environment, and that adverse environmental impacts induce humans to curtail or manage the pressure-exerting activities. However, the

⁴ United Nations World Water Development Report. 2003. Chapter 3, “Signing Progress: Indicators Mark the Way.” Available at: http://www.unesco.org/water/wwap/wwdr/table_contents.shtml

⁵ Adapted from: “National Core Set of Environmental Indicators for State of Environmental Reporting, South Africa.” 2001. Available at: http://www.environment.gov.za/soer/indicator/docs/Scoping_Report_Vol1.pdf

⁶ “US-Mexico Border XXI Program: Progress Report 1996-2000.” Available at: <http://www.epa.gov/usmexicoborder/progress/eng/index.htm>

DPSIR framework introduces two additional concepts: 1) human well-being is related to environmental quality; and 2) society’s behavior and economic pressures affect the environment and thus, human well-being.⁷ This framework incorporates these concepts by adding the categories “Driving forces” and “Impacts” to the PSR framework (see Figure 1). Therefore, in the DPSIR framework, societal Driving forces lead to anthropogenic Pressures, which lead to a State, which generates Impacts that evoke Responses. The “Responses” compartment feeds back into every other compartment, showing that interventions can occur at each point along the causal spectrum. Further explanation and examples of each compartment are given below.



Driving Forces

Driving Forces are socio-economic factors that cause environmental change, which positively or negatively influence pressures on the environment. Common examples of Driving Forces are population size and make-up, use of resources, and education levels (e.g., number of inhabitants or energy consumption).⁸

Pressures

Pressures are natural or anthropogenic factors that directly influence the state of the environment. As the OECD describes, Pressures “change [the environment’s] quality and quantity of natural resources.”⁹ A common example is the level of output from sources

⁷ Gentile, A.R. “From National Monitoring to European Reporting: the EEA Framework for Policy-Relevant Environmental Indicators.” European Environment Agency. Available at: <http://www.desertification.it/asv/doc/ASINARA%20WEB/04gentile.htm>

⁸ United Nations University. *Regions at Risk: Comparisons of Threatened Environments* 1995. <http://www.unu.edu/unupress/unupbooks/uu14re/uu14re0u.htm>

⁹ Organization for Economic Co-operation and Development. 1993. “Environmental Monographs, N° 83: OECD core set of indicators for environmental performance reviews.” Paris. Available at: <http://lead.virtualcentre.org/en/dec/toolbox/Refer/gd93179.pdf>

(e.g., the number of carbon dioxide-emitting vehicles on the road, or the amount of effluent released from point-sources into rivers).

State

State refers to measures of the quality of the environment and the quantity of natural resources. A typical example is the concentration of a particular pollutant in a media (e.g., concentration of ozone-damaging pollutant in the air or count of fecal coliform in water).¹⁰

Impacts

Impacts are the effects that the condition of the environment has on people, animals, and ecological processes. Common examples are the degree of disease and exposure to environmental contaminants in biological populations (e.g., incidence of gastro-intestinal disease in a county).

Responses

Responses are the efforts undertaken by society to respond to environmental changes and issues. As targeted action measures, Responses are typically expressed as program activities (e.g., number of inspections conducted or number of farm workers trained on pesticide risks).

DPSIR is able to provide a more comprehensive and unified conceptual framework to the diverse and binational professional body of Border 2012, thereby facilitating communication and cooperation. It is a resilient model that it can be tailored to fit the needs of specific programs by emphasizing the indicator compartments of interest. Finally, DPSIR is well suited to the Border 2012 program because it allows for the identification and analysis of relationships between border-specific development actions and the effects produced on the environment and human health. The enhanced understanding of these relationships would allow policy-makers to develop the region in a sustainable manner, aware of potential environmental and human health consequences.

IV. INDICATOR DEFINITIONS

Indicators are more than just any given measurement; they are the interpretation of the available data. The 2003 United Nations World Water Development Report stated that “an indicator, comprising a single data (a variable) or an output value from a set of data (aggregation of variables), describes a system or process such that it has significance beyond the face value of its components. It aims to communicate information on the system or process.”¹¹

This definition implies that, regardless of the type of measurement from which they derive, indicators convey information on a system or process in a way that is meaningful for their users. Therefore, indicators should be useful, versatile tools that allow one to understand and assess a system, predict and test relationships between compartments, formulate policy, and make well

¹⁰ US EPA, The 1997 U.S.-Mexico Border Environmental Indicators Report

¹¹ United Nations World Water Development Report. 2003. Chapter 3, “Signing Progress: Indicators Mark the Way.” Available at: http://www.unesco.org/water/wwap/wwdr/table_contents.shtml

informed decisions. For the Border 2012 program, indicators will be identified as either environmental or program indicators, and further classified according to the DPSIR framework. While this framework serves as a systems guide, indicators should not be limited by it, and the exact composition of the framework may change in response to the needs of the stakeholders and the actions under evaluation.

The environmental and program indicator definitions are specific to the Border 2012 program and keyed to what the indicators do.

- **Environmental Indicators** communicate information regarding the region's environmental and health conditions. They aid in:
 - Assessing conditions and trends in any one compartment of DPSIR in order to show improvement or deficiencies in the system; and/or
 - Understanding the relationship between the different compartments in order to make predictive associations between two compartments of DPSIR and formulate policy. Associations should be quantitative, and either correlative or causative.

- **Program Indicators** communicate information regarding environmental management activities and targeted response measures. They aid in:
 - Measuring progress toward meeting Border 2012 outlined goals and objectives; and/or
 - Understanding the effect of response actions on a particular DPSIR compartment and/or on influencing the overall DPSIR system in order to evaluate the program.

Both environmental and program indicators are necessary for evaluating the effectiveness of the Border 2012 program in improving the region's environmental and health-related conditions. While the two indicator types should not be used interchangeably, the use of an integrated set of indicators will provide representative, meaningful information. Environmental indicators are distinctly identified by their ability to communicate information about the Driving Forces, Pressure, State, or Impact portions of the system, while program indicators inform about the Response portion or general administrative activities.

Indicators are therefore able to serve the many needs of the Border 2012 program, including describing an environmental factor at a given moment, showing trends, or measuring progress towards a given goal. Indicators also help to describe the overall system, and it is through this systems view that understanding is increased and a basis is formed on which to make well informed decisions. Indicators can gauge program accomplishments and can significantly aid in planning and management processes.

V. PROCESS FOR INDICATOR DEVELOPMENT

Developing indicators under a systematic method, standardized to all Border 2012 entities, is important as a common approach will allow for continuity between partners and efforts. The development process for Border 2012 indicators can be broken down into six distinct steps:¹²

1. Define the information need
2. Develop a conceptual framework
3. Formulate potential indicators
4. Evaluate potential indicators on the basis of selection criteria
5. Adopt/develop/implement indicators
6. Review indicators

1. Define the information need

The Border 2012 program identifies six priority areas, which can be divided into two categories: 1) media-specific, including water, air, and land; and 2) cross-dimensional media, including environmental health, emergency preparedness and response, and cooperative enforcement and compliance. Information is needed about each of these areas, specifically on how well the corresponding objectives are being met. Comprehensively, the goals of Border 2012 aim to improve the environmental health of the region; thus, information is needed about the environmental and health conditions of the border area. The cross-dimensional categories are unique in that they inherently relate to the media-specific categories, and consequently, require multi-faceted information to show progress.

2. Develop a conceptual framework

DPSIR, as described earlier, offers a systemic and comprehensive approach for organizing indicators in the Border 2012 program. A conceptual framework generally has two main purposes: 1) to provide a visual abstraction of how the different factors interrelate, and 2) to define and delineate the important concepts and organize these into a logical structure. Utilizing a common framework will aid the Border 2012 program in conducting statistical measurements, data analysis, analytical interpretation, and communication that are required to develop and effectively use indicators.

3. Formulate potential indicators

The antecedent Border XXI program initiated the binational indicator development process, thus facilitating the formulation of potential indicators for the Border 2012 program. Indicator works conducted by partner organizations such as SCERP and PAHO, and by the state and federal governments of the US and Mexico, serve as a primary resource for the formulation of indicators. However, input is necessary from all stakeholders, particularly the media groups corresponding to the program goals. Hence, several review phases are required so that the indicators identified (see Appendix A) are both relevant to the program's goals and objectives, and representative of the various taskforces' actions being implemented to improve the environmental and health conditions of the border region. The outcome will be a binational set of potential Border 2012 indicators, which should then be evaluated on the basis of selection criteria.

¹² Adapted from United Nations World Water Development Report. 2003. Chapter 3, "Signing Progress: Indicators Mark the Way." Available at: http://www.unesco.org/water/wwap/wwdr/table_contents.shtml

4. Evaluate potential indicators on the basis of selection criteria

Each potential indicator should be evaluated on the basis of selection criteria, which is organized into three tiers: core, quality of data availability and media-specific. Although the final indicator criteria may vary slightly by the needs of a given work group or task force, there is a set of criteria that is fundamental to the Border 2012 program.

Tier 1: Core Criteria

Core criteria¹³ are of equal importance and should be met by all indicators developed for the Border 2012 program

- ***Representative***

All indicators should be representative of what they purport to describe in a binational nature. Although the ideal indicator would be one measure that can be collected on both sides of the border, it is also possible to have a matched pair of indicators collected in both countries that are comparable in scope and have the potential to be harmonized. This caveat is created specifically for situations in which it is not feasible to collect data by the same method in each country.

- ***Policy relevance***

Indicators must provide relevant information to management and policy areas as well as to society's concerns about ecological conditions and/or human health. Specifically, indicators should provide useful and accurate information about the state of the border's environment, measure changes in those conditions, and show how the trends respond to society's actions. As a result, indicators should clarify the relationship between the natural system and human activities, providing a useful tool for improved decisions and policies. For Border 2012 indicators, "policy relevance" can be defined as the ability of an indicator to address program objectives and goals and lead to policy applications on the US-Mexico border.

- ***Scientific validity and methodological rigor***

Technical and scientific accuracy are characteristics that support the reliability and validity of an indicator.¹⁴ Ideally, indicators should be based on sound, reproducible research and on accurate measurements that produce consistent results. The data must also be precise enough that the indicator is able to address its intended purpose; otherwise, the indicator would lose power and utility. However, requiring a quantifiable measure does not mean that indicators should be complicated. On the contrary, it is important to keep indicators simple and easy to interpret.

¹³ Adapted from Selman, 1996; PAHO, 2001, Jackson, 2003; OECD, 2003; Pastille, 2002.

¹⁴ PAHO, 2001.

- ***Sensitive to change***

Indicators must be flexible and responsive to changes in the border region. Developing indicators may require a target or baseline in order to measure significant changes that occur later in time. This is needed to acknowledge the factors that can affect the values represented by the indicators: errors of measurement or natural variability (spatial or temporal) variability.¹⁵ For this reason, the data of Border 2012 indicators should be collected and reviewed frequently enough for it to reflect the true conditions of the system.

- ***Public understanding and acceptance***

Indicators play an important role in raising public awareness. Hence, indicators should be transparent and simple enough to be understood by the public. A well informed public is more likely to be involved in the border initiative. Public acceptance of Border 2012 indicators will depend on the active participation of communities in identifying their own perceptions and interests regarding their information needs. Ultimately, public acceptance will affect overall policy performance.

Tier 2: *Quality of Data Availability Criteria*

After this first evaluation, potential indicators need to be assessed with regard to the availability of quality data. If data is insufficient or unavailable, the feasibility of collecting the necessary data for future development of the proposed indicator should be determined. If this is possible, as an interim measure, an alternate potential indicator may be developed and calculated. If not, another indicator should be formulated and proceed with the evaluation process.

- ***Information availability***

The availability of valid data is a fundamental consideration for an indicator. In most cases, it will be preferable to select indicators that derive from pre-existing data sets because it may be cost-effective and result in a timelier fashion. Moreover, if data already exists, it can be used as a baseline. On the other hand, a data gap should not necessarily prohibit the development of an indicator, if the potential uses of the indicator are deemed sufficiently valuable. In this case, the most appropriately available indicator would be used until the data for the ideal indicator is gathered.

- ***Information compatibility***

Indicator data must be accessible by a variety of stakeholders to be used for any given number of purposes. This means that datasets that can easily be used for other Border 2012 indicator tasks will be more appealing than measures that are singular or unique. The compatibility of data is particularly crucial since Border 2012 indicators will be used across national boundaries and data management systems. Also, where feasible, indicators should be similar to or the same as the indicators used to report on national environmental conditions respectively in the US and Mexico.

¹⁵ Jackson, Laura E., Kurtz, J and Fisher, W, eds. (2000). *Evaluation Guidelines for Ecological Indicators*. EPA/620/R-99/005. U.S. Environmental Protection Agency, Office of Research and Development, Research Triangle Park, NC

Tier 3: Media-specific Criteria

Because the objectives of each Border 2012 group differ, additional criteria should be introduced by the individual groups in developing the indicators. These criteria should be delineated based on the workgroup or policy forum needs and program objectives. A sample list of additional criteria is included here, but groups should add to or detract from this list as necessary.

- ***Appropriate spatial and temporal scale***

Consideration of scale brings up problems of aggregation or disaggregation of data: the ability of data to be combined or separated to obtain relevant information. For example, data gathered at a regional spatial scale may not accurately represent the local situation, and data gathered at a local scale may not be applicable to a region. Alternately, data gathered with a specific temporal scale may not adequately account for trends such as seasonality. Unless aggregation is feasible, datasets that were collected at different scales (spatial or temporal) will be difficult to merge.

- ***Feasibility/cost effectiveness of implementation***

Indicators must be developed with consideration of costs, logistics and institutional requirements, including administrative time. The development and maintenance of a systematic and reliable database requires monitoring and updating that can be costly enough to exceed the benefits of developing the indicators. The developers of indicators should be able to predict that a net benefit will result from their investment.

After assessing the potential indicators by the above criteria, those that meet the criteria will be included in the binational basic set of indicators and recommended for the Border 2012 program. Agreeing to track a common set of indicators will make binational, border-wide analysis feasible. It is important to note that the basic set of indicators may change over time to accommodate for better indicators, or to include more specific, localized indicators that have increased in border-wide importance.

5. Adopt/Develop/Implement indicators

Once the basic set of indicators has been recommended the next step is to reach border-wide consensus in order to develop and implement these indicators. In developing the indicators, caveats may surface such as a lack of sufficient or adequate data or a lack of resources to gather and process data. Indicators that cannot be feasibly developed will not be selected for the initial indicator set, but may be incorporated in the future. Whichever indicator is to be implemented necessitates consensus of program stakeholders. The implementers should feel confident that the indicator is of high quality and similarly the regional work groups should feel confident that the indicator will provide them with a valuable resource in addressing local issues. Upon reaching consensus, a definite set of indicators will be officially adopted by the Border 2012 program as the basis for tracking progress toward achieving the Program objectives and goals,

6. Review indicators

Indicators can be used on either an on going basis or for a finite period of time. Regardless of the length of data collection or indicator usage, a review process is necessary to evaluate the performance of the indicator. What may be a useful indicator at the present may change with time, given the development of technology, further improvements along the border, changing needs of the public or increased insights in policy or science. The review should answer at least the following questions:

- Purpose – *Why was the indicator developed?*
- Data collection and management – *What protocol was followed?*
- Data reliability – *Is the source reliable?*
- Quality assurance – *How accurate and precise is the data?*
- Information – *What does the indicator convey? Is it true to its purpose? How does the information compare to the standard?*
- Limitations – *What are the outstanding gaps or limitations of the indicator?*
- Conclusion – *Is the data useful and should the indicator continue to be used?*¹⁶

The BITF proposes that a review occur two years after an indicator is first implemented, and then every five years thereafter. However, ultimate decision lies with the National Coordinators, who will periodically review the indicators and report the result to the workgroups, fora and the public.

VI. STRATEGY - Vision for Border 2012 Indicators

With the selection of a conceptual framework, program-wide criteria, indicator terminology, and a list of potential indicators for Border 2012, the BITF hopes to provide a solid foundation for the development of indicators. As indicator development is a collaborative process, all entities are responsible for developing indicators and assuring that there is at least one candidate indicator that meets the respective Border 2012 goal or objective.

Communication:

As indicators are developed, it is important to remember that communication is key between and among the binational regional and border-wide work groups, policy fora, and local task forces. Both successes and lessons learned should be shared widely, especially with the BITF and National Program Coordinators. Additionally, indicators will only be successful if they are truly binational in nature, so it is essential that final documents be made available in both languages. Since one of the purposes of indicators is to evaluate the outcomes of the Border 2012 program, these outcomes should be transparent and simple to understand by the border communities.

¹⁶ Adapted from Niskar AS. The development of a guide to evaluate the usefulness of data sources for environmental public health surveillance (dissertation). Chapel Hill (NC): University of North Carolina;2003.

VII. CONCLUSION

The mission of the Border 2012 program is “to protect the environment and public health of the U.S.-Mexico border region, consistent with the principles of sustainable development.” Since the majority of the program objectives are programmatic in nature, stakeholders should strive to meet these objectives, yet also reach beyond the guidelines of the framework. This is important because fulfilling the mission will require a broad perspective, careful research, and monitoring of progress.

The use of indicators has emerged as a promising tool that allows events in complex systems to be monitored, modeled, and ultimately predicted. These capacities will provide policy-makers tools with which to address the needs of the communities they serve. Because the participants of the Border 2012 program represent many different interests, a common method of documenting and analyzing border conditions and Border 2012 programs is necessary. The Border Indicators Task Force has sought with this strategy document to provide a framework for a common methodology and conceptualization of indicators.

The BITF’s goal is that Border 2012 indicators will be sustainable and well maintained, so that they remain useful resources. Indicator development – as an ongoing, flexible process – will continue to be adapted as data becomes available and conditions change.

The BITF expects that increasing understanding of border conditions, strengthening the capacity of health professionals and environmental regulators and policy makers to respond to crises, and reporting accurately the strengths and weaknesses of Border 2012 projects will be the outputs of the indicators project. These successes will provide the necessary evidence and possible solutions to make lasting improvements in health and environmental quality in the border region.

The United States and Mexico share problems in the border region; these countries must learn to share solutions as well. The Border 2012 program will be at its strongest when its members are able to work cooperatively. Likewise, the indicator program will function best when it has input from all stakeholders. Despite the challenges of trans-national work, the BITF believes that indicators research will strengthen communication, data-sharing, technology transfer, and scientific collaboration across the border. Working together, we will have the most complete set of knowledge and resources to help create a healthy border region for everyone.

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APPENDIX A

Binational Set of Indicators for the Border 2012 Program (Draft)

Objective

This list is intended to stimulate discussion and consideration among the various workgroups regarding the appropriateness of the indicators for measuring program progress and assessing environmental and health changes in the region's conditions. It is important to note that this list of potential indicators, given further refinement, will eventually become the official Binational Set of Indicators for the Border 2012 program.

Description

This list evolved from an initial inventory of the indicators utilized by different initiatives to measure the environmental and health conditions of the US-Mexico border region. This process included a literature review of national and international indicators, followed by the selection of those indicators that align to the goals and objectives of the Border 2012 program. Even though many of the indicators have been identified or utilized in the past by other organizations, only those indicators that are relevant to the objectives of Border 2012 were included in this listing.

Collaboration and Feedback

The development of a Binational Set of Indicators for the Border 2012 program is an on going process that requires the input of all Border 2012 participants. It is necessary that all workgroups review the proposed indicators and comment on their possibilities or limitations and suggest different or better indicators. Along with this feedback, workgroups should provide information about the availability of data for the calculation of these indicators. Likewise, knowing about the projects and action items that each group is implementing is useful during indicator development.

Environmental Indicators communicate information regarding the region's environmental and health conditions.

Program Indicators communicate information regarding environmental management activities and targeted response measures.

Environmental indicators are identified by their ability to communicate information about the Driving Forces, Pressure, State, or Impact portions of a system, while program indicators inform about the Response or general administrative activities.

However, some of the indicators may be hybrid containing aspects of both the environmental and program indicators.

Goal 1: Reduce water contamination

Objective 1: By 2012, promote a 25% increase in the number of homes connected to potable water supply and wastewater collection and treatment systems.

Baseline: Annual cumulative number of full public water services, including potable water supply, distribution capacity, common sewers, and wastewater treatment capacity made available to residents.

Environmental Indicators

- *Number and percent of homes connected to potable water supply by county*
- *Number and percent of homes connected to wastewater collection by county*
- *Number and capacity of wastewater treatment plants in the border region*

Program Indicators

- *Number and type of water supply, wastewater collection and treatment system projects by location*
- *Completed or expected results of potable water supply and wastewater collection and treatment system projects*

Objective 2: By 2012, assess significant shared and transboundary surface waters and achieve a majority of water quality standards currently being exceeded in those waters.

Baseline: Shared and transboundary surface waters as defined, identified and evaluated for the United States in the Clean Water Act §305(b) State reports and for Mexico by SEMARNAT.

Environmental Indicators

- *Quality of surface waters by water bodies (physical, chemical and biological parameters)*
- *Classification by the type of use of the surface water bodies*

Parameters to be assessed (US-MX): Electrical conductivity, total dissolved solids, dissolved oxygen, total and fecal coliform, nutrients

Program Indicator

- *Projects oriented to evaluate and improve the quality of the water in the shared and transboundary surface waters*

Objective 3: By 2006, implement a monitoring system for evaluating coastal water quality at the international border beaches. By the end of 2006, establish a 2012 objective toward meeting coastal water quality standards of both countries.

Baseline will be established by the end of 2006 in accordance with federal or state standards that either exist or for which the Border 2012 program will support development.

Program Indicators

- *Number and location of monitoring systems for evaluating coastal water quality*
- *Number of coastal water quality samples*
- *Actions implemented for the establishment of a monitoring system for evaluating coastal water quality at the international border beaches*

Objective 4: By 2005, promote the assessment of water system conditions in 10% of the existing water systems in the border cities to identify opportunities for improvement in overall water system efficiencies.

Environmental Indicator

- *Percent of water lost between the distribution system and the end consumer*

Program Indicators

- *Investments in public water systems for the border cities*
- *Projects oriented to the evaluation and improvement of the efficiency of the water systems in the border cities*

Goal 2: Reduce air contamination

Objective 1: By 2012 or sooner, reduce air emissions as much as possible toward attainment of respective national ambient air quality standards, and reduce exposure in the border region, as supported by the following interim objectives.

Environmental Indicators

- *Number of days with AQI or IMECA equal or greater than 100*
- *Number of days the ambient air quality standards were exceeded for pollutants by city*
- *Annual average and annual maximum hourly air concentrations of pollutants by city*

Pollutants to be assessed (US-MX): Ozone, PM10, CO, NO_x, and SO₂

Program Indicator

- *The actions implemented to fulfill the interim objectives*

Interim

Objective 1: By 2003, define baseline and alternative scenarios for emissions reductions along the border, and their impacts on air quality and human exposure.

Environmental Indicators

- *Inventory of air emission pollutants by border city*
- *Population living in an area with an ambient monitoring system*

Program Indicators

- *Number and location of ambient monitoring systems*
- *Projects to evaluate the quality of the air*
- *Actions to define the baseline and alternative scenarios for emissions reductions*

Interim

Objective 2: By 2004, based on results from interim objective 1, define specific emissions reductions strategies and air quality and exposure objectives to be achieved by 2012.

Environmental Indicators

- *Kilometers of additional paved roads since 2004*

Program Indicators

- *Studies to determine human exposure levels to air emission pollutants*
- *Strategies for the reduction of air emissions and exposure to pollutants*

Goal 3: Reduce land contamination

Objective 1: By 2004, identify needs and develop an action plan to improve institutional and infrastructure capacity for waste management and pollution prevention as they pertain to hazardous and solid waste and toxic substances along the U.S.-Mexico border. Starting in 2005, the plan will be implemented and concluded by 2012.

Environmental Indicators

- *Annual generation of solid waste in the border region by county*
- *Annual generation of hazardous waste in the border region*

Program Indicators

- *Number and capacity of solid waste disposal facilities*
- *Quantity and percent of solid waste disposed in landfills*
- *Recycling, storage and treatment infrastructure for hazardous waste in the border region*
- *Projects to improve the institutional capacity and infrastructure for waste management*
- *Programs to minimize waste*

Objective 2: By 2004, evaluate the hazardous waste tracking systems in the United States and Mexico. During the year 2006, develop and consolidate the link between both tracking systems.

Environmental Indicator

- *Amount of hazardous waste imported and exported through the US - Mexico border*

Program Indicator

- *Actions to evaluate and harmonize the hazardous waste tracking systems in the US and México*

Objective 3: By 2010, clean up three of the largest sites that contain abandoned waste tires in the U.S.-Mexico border region, based on policies and programs developed in partnership with local governments.

Environmental Indicators

- *Quantity of waste tires at dump sites (total and per site)*
- *Number of waste tires recycled or reused*

Program Indicator

- *Actions and programs developed for clean up of the abandoned waste tire sites*

Objective 4: By 2004, develop a binational policy of clean-up and restoration resulting in the productive use of abandoned sites contaminated with hazardous waste or materials, along the length of the border in accordance with the laws of each country. By 2007, apply this policy at least once in each of the four geographic regions.

Environmental Indicators

- *Abandoned and illegal hazardous waste sites in the border region*

Program Indicator

- *Number and location of sites for clean-up and restoration in the border region*
- *Projects implemented for the productive use of abandoned sites contaminated with hazardous waste or materials*

Goal 4: Improve environmental health

Objective 1: (AIR) By 2006, evaluate various measures of respiratory health in children that might be tracked to assess changes that may result from actions to improve air quality in border communities.

Environmental Indicators

- *Asthma prevalence in children under 5 years old (measured by hospital visits)*
- *Incidence of morbidity due to acute respiratory infections in children under 5 years old*

Program Indicator

- *Number of studies of the relationship between air quality and respiratory health in children in border communities*

Objective 2: (WATER) By 2006, evaluate various measures of gastrointestinal illness that might be tracked to assess changes that may result from actions to improve water quality in border communities.

Environmental Indicators

- *Incidence of gastro-intestinal diseases*
- *Annual diarrhea morbidity and mortality in children under 5 years old*

Program Indicator

- *Number of studies of the relationship between water quality and gastrointestinal health in border communities*

Objective 3A: (PESTICIDES) By 2006, an assessment and pilot program will be completed that explores the feasibility of harmonizing a binational system for reporting acute pesticide poisonings.

Environmental Indicators

- *Yearly number of reported pesticide-related poisonings by county*
- *Mortality rate due to pesticide poisonings*

Program Indicator

- *Results of the pilot program on the harmonization of a binational system for reporting acute pesticide poisonings*
- *Progress in the implementation of procedures for acute pesticide poisoning reporting*

Objective 3B: By 2007, reduce pesticide exposure by training 36,000 farm workers on pesticide risks and safe handling, including ways to minimize exposure for families and children.

Program Indicators

- *Number of farm workers trained on pesticide risks and safe handling*
- *Number of organizations dedicated to exchanging pesticide related information at the border region*
- *Actions to promote the safe handling of pesticides*

Objective 4A: (CAPACITY BUILDING) By 2006, establish a distance-learning, post-graduate degree program to support advanced training on environmental health in conjunction with Pan American Health Organization regional offices and academic institutions.

Program Indicators

- *Progress in the establishment of distance-learning, post graduate degree program on environmental health*
- *Number of students enrolled in the environmental health related distance-learning, post-graduate degree program*

Objective 4B: By 2004, extend current efforts in binational environmental health training for 100 health care providers each for pesticides and water.

Program Indicators

- *Number of health care providers trained*
- *Actions for strengthening binational environmental health training efforts*

<p>Goal 5: Reduce exposure to accidental chemical releases and/or acts of terrorism</p>
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Objective 1: By 2004, a chemical emergency advisory/notification mechanism between Mexico and the United States will be clearly established.

Environmental Indicator

- *Number of recorded border area accidents per year and by type*

Program Indicator

- *Actions to update the chemical emergency advisory / notification mechanism: Joint US-Mexico Contingency Plan (JCP)*

Objective 2: By 2008, joint contingency for all 14 pairs of sister cities will be in place and operating (including exercises) with the establishment of binational committees for chemical emergency prevention (or similar border forums).

Program Indicators

- *Number of sister city joint contingency plans (JCPs) in place and operating*
- *Number of annual tests and exercises of the sister city JCP*
- *Number of sister cities that have the Computer Aided Management of Emergency Operations CAMEO program*
- *Number of emergency response personnel trained to use CAMEO*

Objective 3: By 2012, 50% of Sister City Joint Contingency Plans will be supplemented with preparedness and prevention related efforts, such as risk and consequences analyses, risk reduction and counter-terrorism.

Program Indicators

- *Number of preparedness and prevention training and exercises conducted in sister cities*
- *Number of hazardous materials commodity flow studies (CFS) conducted in sister cities*

Goal 6: Improve environmental performance through compliance, enforcement, pollution prevention, and promotion of environmental stewardship

Objective 1: By 2006, increase by 50% the number of industries along the U.S.-Mexico border implementing voluntary compliance and/or self-audits (such as the development of an Environmental Management System [EMS] or participation in voluntary assessment programs) using 2003 as a baseline year.

Environmental Indicators

- *Number and percent of industries implementing an Environmental Management System (EMS)*
- *Number and percent of industries that participate in voluntary assessment programs*
- *Number and types of industries located in the border region*

Program Indicators

- *Actions to foment the implementation of voluntary compliance programs along the border*

Objective 2: By 2006, determine the pollution sources in the border area that present high risks to human health and environment that are subject to regulation to priorities for actions to lower the risk.

Environmental Indicators

- *Inventory of high risk pollution sources (classified by industry and location)*

Program Indicator

- *Number of actions taken to lower the risk from industrial pollution sources in the border region*

Objective 3: By 2012, increase compliance in the priority areas determined in Objective 2, by assessing and responding to citizen complaints, compliance assistance, compliance incentives, compliance monitoring, and enforcement to reduce the risks from non-compliant facilities and encourage voluntary pollution prevention.

Program Indicators

- *Number of total and partial closures*
- *Number of citizen complaints and percent addressed*
- *Number of compliance monitoring efforts in the border region*

APPENDIX B

ACRONYMS

BITF	Border Indicators Task Force
CDC	Centers for Disease Control and Prevention
DPSIR	Driving Forces-Pressure-State-Impact-Response
OECD	Organization for Economic Co-operation and Development
PAHO	Pan American Health Organization
PSR	Pressure-State-Response
SALUD	Mexican Secretariat of Health
SCERP	Southwest Center for Environmental Research and Policy
SEMARNAT	Mexico’s Secretariat of Environment and Natural Resources
USEPA	U.S. Environmental Protection Agency
WHO	World Health Organization

ABREVIATURAS

Equipo de Trabajo de Indicadores Fronterizos
Centro para el Control y la Prevención de Enfermedades
Fuerza Motriz- Presión-Estado-Impacto-Respuesta
Organización para la Cooperación y el Desarrollo Económico
Organización Panamericana de la Salud (OPS)
Presión-Estado-Respuesta (PER)
Secretaría de Salud
Centro de Investigación y Política Ambiental del Suroeste
Secretaría de Medio Ambiente y Recursos Naturales
Agencia de Protección Ambiental de los EE.UU
Organización Mundial de la Salud (OMS)