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INCORPORATING CLIMATE CHANGE INTO EPA'S PLANNING, MANAGEMENT, AND BUDGET SYSTEM

LESSONS FOR CAMBODIA



SEPTEMBER 2015

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ACRONYMS

CAA	Clean Air Act
CWA	Clean Water Act
EPA or Agency	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FY	fiscal year
GHG	greenhouse gas
GPRA	Government Performance and Results Act
ICLUS	Integrated Climate and Land Use Scenarios
ITEP	Institute for Tribal Environmental Professionals
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MEF	Ministry of Economy and Finance
MoE	Ministry of Environment
MoF	Ministry of Finance
NGO	nongovernmental organization
OCFO	Office of the Chief Financial Officer
OMB	Office of Management and Budget
PBB	Program-Based Budget
PFMRP	Public Financial Management Reform Program
PM	particulate matter
RDM	Robust Decision-Making
RGC	Royal Government of Cambodia
U.S.	United States

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I. INTRODUCTION

As part of a larger Public Financial Management Reform Program (PFMRP) effort to improve the country's management of its fiscal affairs, the Royal Government of Cambodia (RGC) is implementing a Program-Based Budget (PBB) system. The system should help improve management and accountability for meeting strategic planning objectives across the government, including its approach to climate change adaptation. To move the RGC's strategic plans forward, the PBB system translates plan objectives into practical performance measures and annual budgets.

The RGC's PBB system does not yet integrate the consideration of climate change impacts and adaptation (Ministry of Economy and Finance, Undated). However, in its "Rectangular Strategy" report, the RGC expressed interest in taking a comprehensive development approach that would integrate, or "mainstream," climate change into the country's policies, laws, and plans at national and sub-national levels (Royal Government of Cambodia, 2013b, p. 11). The PBB system provides an opportunity for the RGC to mainstream climate change by identifying climate change strategic goals, determining measurable implementation paths, and then budgeting to support that implementation. Mainstreaming climate change into the RGC's PBB system is critical for dedicating budget resources to climate change adaptation and raising awareness about climate-related expenditures. In addition, integrating climate change adaptation into PBB's long- and short-term activities and annual budgets significantly increases the level of government transparency and accountability.

The United States (U.S.) government also undertook fiscal reform starting in the 1990s. The goal of the reform was to improve efficiency and accountability of the national government's fiscal system. Through this process, the U.S. government gained experience implementing performance-based strategies, objectives, and measures as part of its planning, management, and budget system (or PBB system). In 2009, Executive Order 13514 directed U.S. governmental agencies to evaluate climate-related risks to ensure agencies can continue to meet their mission and serve the American public in the face of a changing climate. The U.S. Environmental Protection Agency (EPA or Agency) was one U.S. government agency that integrated climate change considerations into its PBB system.¹ This paper uses EPA, which is the counterpart of the RGC's Ministry of Environment (MoE), as an example of

¹. In this paper, we did not examine integration of climate change adaptation into other U.S. government departments or agencies.

integrating climate change adaptation into a detailed PBB system. Although EPA does not use the term “program-based budgeting,” its system has many of the same tenets. EPA’s experience may provide useful examples – or perhaps a framework – for how the RGC can potentially integrate the consideration of climate change impacts and adaptation into its nascent PBB system. Overall, EPA’s planning, management, and budget system integrates climate change adaptation into its long- and short-term activities and annual budgets, which has significantly increased the level of government transparency.

In this paper, we describe EPA’s planning, management, and budget system (Section 2), discuss how climate change is integrated into this system (Section 3), and provide an analysis of the accomplishments and limitations of EPA’s system (Section 4). We then outline preliminary recommendations for modifying and adapting EPA’s system for use in Cambodia and possibly other developing countries (Section 5) and suggest potential next steps (Section 6). It is critical to note that the authors of this paper are not experts in Cambodia’s current PBB efforts. We are unable to assess whether these preliminary recommendations or next steps are appropriate for Cambodia or, if so, exactly how they should be implemented.

2. DESCRIPTION OF THE EPA PLANNING, MANAGEMENT, AND BUDGET SYSTEM

EPA's mission is to protect human health and the environment; its core work and programs are well-established by its many statutes. For example, the Clean Air Act (CAA) regulates air emissions from stationary and mobile sources and the Clean Water Act (CWA) establishes the structure for regulating discharges of pollutants into waters of the U.S. In the early 1970s, when EPA's original legislation was written and adopted, climate change was not perceived as a problem to be addressed by the government.

In 1993, the U.S. Congress passed the Government Performance and Results Act (GPRA) as part of a series of statutes to improve governance and require management reforms and private-sector approaches across governmental agencies. This led to significant experience implementing PBB systems in the U.S. government, which typically include broad goals, performance-based strategies, objectives, and performance measures.

In 1994, EPA published its first GPRA-required strategic plan and began the process of developing annual planning and budgeting that was built on this strategic plan. As such, EPA has many years of experience building a planning and management system with long-term strategic goals and objectives, annual performance goals and measures, and budget resources tied to these activities. Incorporating climate change mitigation and adaptation into this system started much later. Figure 1 provides an overview of EPA's planning, management, and budget system.

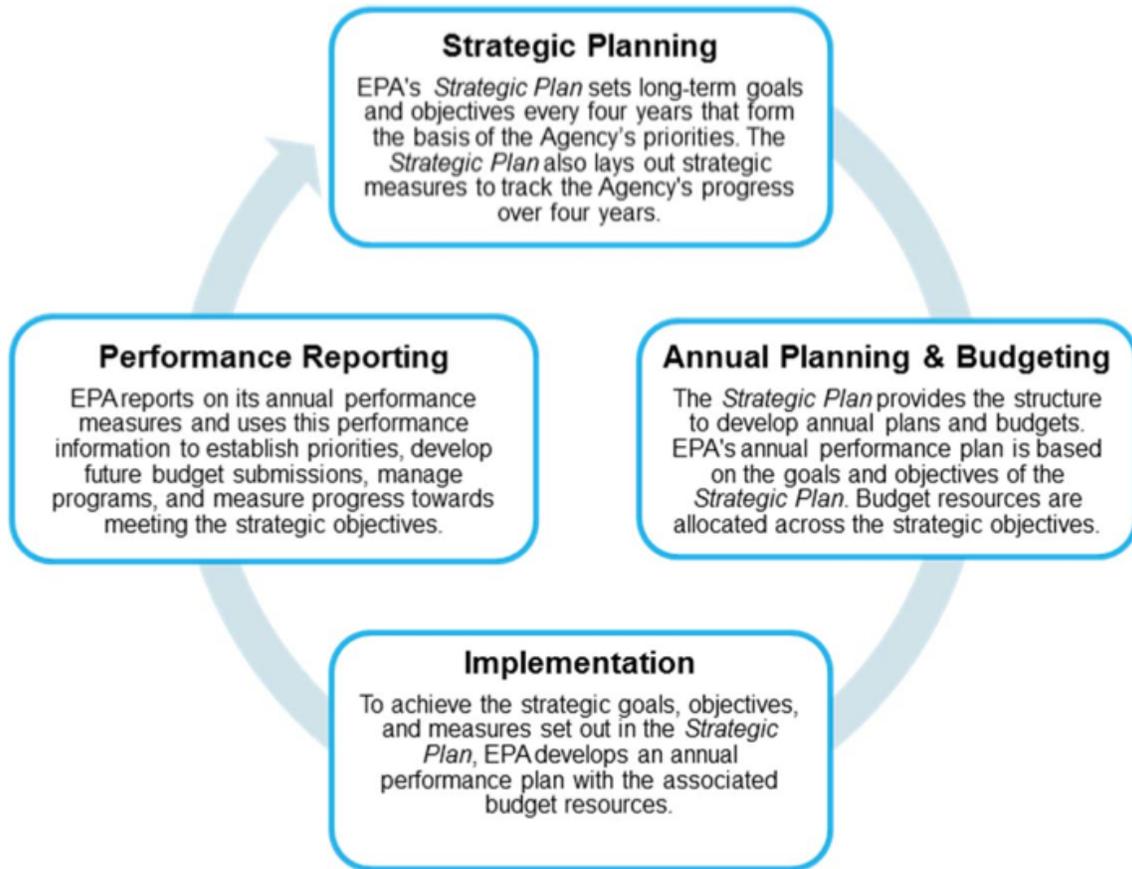


Figure 1. Draft schematic of EPA's planning, management, and budget system.

Source: Adapted from EPA's Performance Management System Diagram; U.S. EPA, 2014b.

The foundation of EPA's strategic plan are the laws that created EPA's primary programs – such as the CAA, which led to the creation of the EPA Office of Air and Radiation; and the CWA, which resulted in the EPA Office of Water. The strategic plan lays out strategic goals, objectives, and measures, as shown in Figure 2.

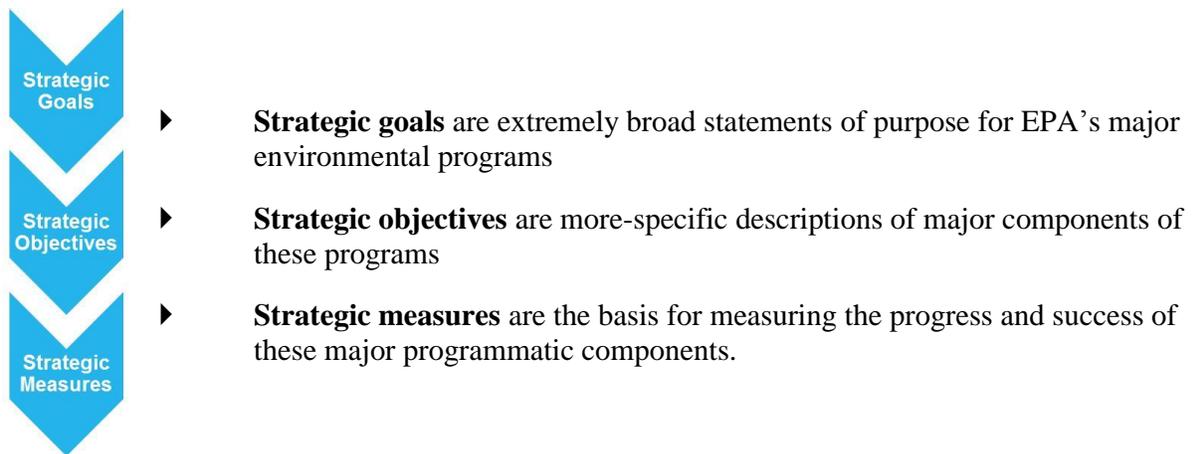


Figure 2. EPA’s strategic goals, objectives, and measures as part of a larger strategic plan.

When EPA began developing its system, climate change was not a major environmental issue. As such, EPA began explicitly incorporating climate change adaptation considerations into this system only in recent years. Figure 3 shows a timeline of the evolution of EPA’s planning, management, and budget system. Given that climate change is now widely recognized as a major environmental and social issue, Cambodia should integrate climate change during the initial phases of the development of its PBB system. This finding for Cambodia is supported by the prominence of climate change in Cambodia’s “Rectangular Strategy” report (Royal Government of Cambodia, 2013b).

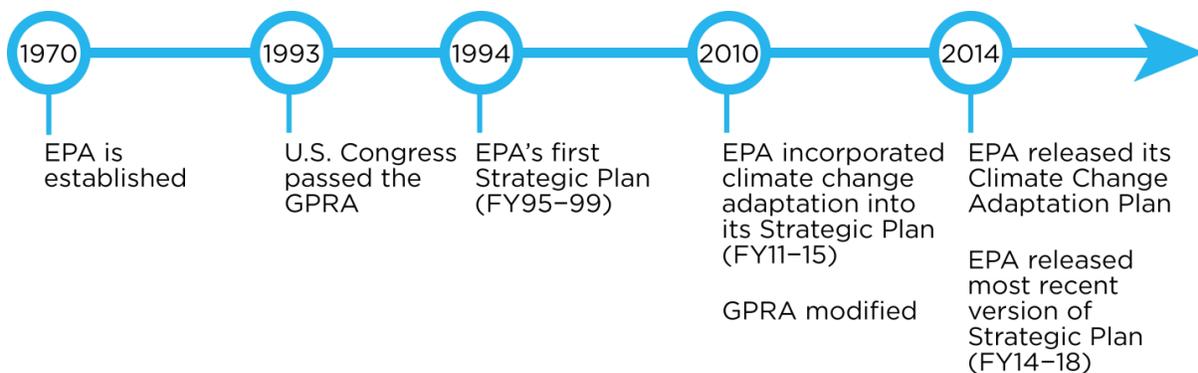


Figure 3. Timeline of the evolution of EPA’s planning, management, and budget system.

2.1. PROCESS FOR DEVELOPING THE STRATEGIC GOALS AND OBJECTIVES

To develop its strategic plan, EPA developed an extensive, time-intensive internal and external process. This process is coordinated by the Office of the Chief Financial Officer (OCFO). OCFO coordinates all Agency-wide strategic and annual planning and also leads the Agency's budget office; OCFO is roughly equivalent to the RGC's Ministry of Economy and Finance (MEF). EPA now completes its strategic plan every four years, coinciding with changes in Presidential Administration. The development of a new strategic plan is a long-term process that can take longer than a year.

At the beginning of the strategic planning process, each major EPA Program Office – such as the Office of Air and Radiation and the Office of Water – develops new language for its overarching goal or evaluates its proposed goal statement. In the current version of the strategic plan [fiscal year (FY) 2014–2018; U.S. EPA, 2014a], EPA has five strategic goals. Because the goals are the broadest overview statements of purpose for EPA's programs, the Agency purposely limited their number. These goals are similar to those in previous strategic plans. The lead office for each goal is the Program Office that is responsible for most of the work within that goal. For example, the Office of Air and Radiation leads the drafting process for Strategic Goal 1, *Addressing Climate Change and Improving Air Quality*. When EPA finalizes the language for the goals, the Agency drafts a limited set of strategic objectives and measures. Again, the Program Office with most of the responsibilities for carrying out these objectives and measuring their progress leads this effort.

Next, EPA puts the strategic objectives and measures through a multi-layered, inclusive internal and external review and consultation process:

- ▶ For the *internal review process*, each of EPA's 10 Regional Offices reviews the strategic objectives and measures from the perspective of their responsibilities for implementing many parts of the strategic plan. In addition, OCFO reviews the strategic objectives and measures, as it has a cross-Agency perspective and can provide some consistency across the goals. After some discussion, the Agency incorporates any comments; often, but not always, the responsible Program Office has the final say in which comments are incorporated into the final strategic plan.
- ▶ The *external review process* is more complex. Every major EPA Program Office has a professional association made up of representatives of state environmental agencies and related programs. These professional associations actively review the strategic plan because they are frequently, along with the Regional Offices, key implementers of the environmental programs. Tribal organizations, which represent indigenous peoples, are also involved in consultations. There are generally opportunities for public comment, which include the private sector and other stakeholders.

- ▶ The *final review* comes from the Office of Management and Budget (OMB), the agency that is the closest equivalent to the RGC’s MEF.² OMB has oversight of all executive agencies in the U.S. government; the office reviews agency budgets, policy initiatives, and regulations. In carrying out these functions, OMB reviews EPA’s strategic plan; OMB may make suggestions or, in some cases, it may require specific changes related to aspects of policy or management.

2.2. INCORPORATING THE STRATEGIC PLAN INTO ANNUAL PLANS AND BUDGETS

Each year, EPA develops its annual performance plan and budget for the following FY; this process aligns the budget accounting system with the objectives of the strategic plan. The annual performance plan requests specific funding to implement the annual activities associated with carrying out the long-term strategic goals and objectives. The annual budget is tied to specific core program activities that will advance the EPA Administrator’s priorities and the Agency’s strategic plan (U.S. EPA, 2014b). The annual performance measures are also aligned to the objectives of the strategic plan. The architecture of the strategic plan is the foundation for each annual plan and budget.³

Development of the annual performance plan and budget is an internal process led by staff in each Program Office, with review and oversight by OCFO. OMB has final approval of all budgets; in the final approval process, OMB ensures that the Agency’s budget request does not exceed any limits from OMB’s annual guidance for formulating the budget. OMB approves or disapproves any requests for funding new areas of work, including work related to climate change adaptation.

2.3. TRACKING THE PERFORMANCE OF GOALS, OBJECTIVES, AND MEASURES

2.3.1. BUILDING A SYSTEM FOR ACCOUNTABILITY

The development of performance measures – both long-term strategic measures and short-term annual measures – are critical to the transparency and accountability of the planning, management, and budget system. Performance measures need to be relevant to the ultimate objectives of the program. In addition, performance measures need to have numerical targets that can be tracked over enough years to be meaningful. Although performance measures need to be improved over time, they cannot change frequently or extensively. OMB approves all of EPA’s performance measures as part of its oversight of this accountability function.

². A key difference between OMB and MEF is that OMB is housed in the Executive Office of the President, whereas MEF is a Cabinet Ministry.

³. EPA’s budget accounting structure was developed before GPRA and the planning, management, and budget system. This led to some difficulties in aligning the budget with the new strategic, performance-based system.

2.3.2. TYPES OF PERFORMANCE MEASURES

To design a system that has accountability in both the short- and long-term, officials must understand the various types of performance measures. *Strategic measures* are the longer-term measures that can demonstrate whether Program Offices are accomplishing their strategic objectives. *Annual measures* typically account for key annual activities that are critical to meeting the strategic objectives; these shorter-term measures can demonstrate that the Agency is moving along a reasonable path before the long-term strategic measures can verify this trend.

Below is an example framework of measures from the short-term to the long-term. In Figure 4, we use a climate mitigation example to show how this system works at EPA.

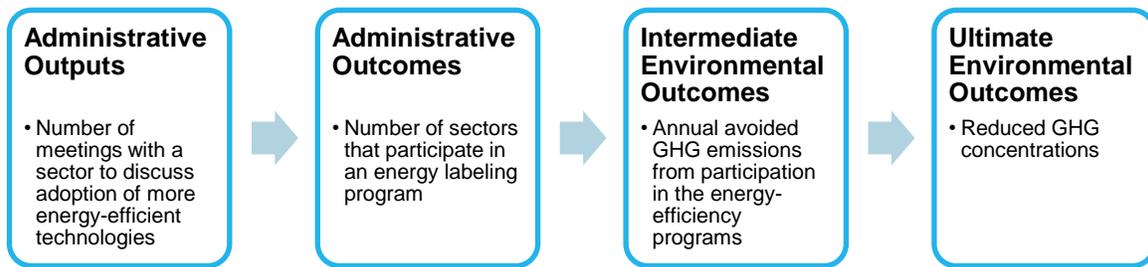


Figure 4. Framework of performance measures using climate change mitigation as an example.

- ▶ **Administrative outputs:** These short-term measures are generally measures of programmatic activities. They are easy to count and especially useful in the early years of program development.
- ▶ **Administrative outcomes:** These measures are the end result of several years of annual activities. It can mean that a program has achieved an important milestone, although direct environmental results are not being measured.
- ▶ **Intermediate environmental outcomes:** These measures are the first level of actual environmental results. In a more mature program, these can become annual measures and their cumulative benefit can become a more strategic measure.
- ▶ **Ultimate environmental outcomes:** These long-term measures are changes in environmental or health conditions.

To ensure accountability, administrative output and program outcome measures are critical, especially in the early years of a program's activities. However, the actual purpose of the strategic goal and objective is to achieve the intermediate and ultimate environmental outcomes.

In the early stages of a program, measures of administrative activities may take precedence, as there may not be any environmental data available to use for a measure. In EPA's experience, there is tension between measures of ultimate environmental outcomes versus the less-complex administrative measures. Administrative measures do not cost very much to obtain; they simply require staff to develop a system to count program activities. On the other hand, environmental data and modeling efforts to estimate environmental conditions can be costly. The development of a base program may incorporate funding for collecting and analyzing environmental data (e.g., monitoring for general air quality programs) and include a budget for air quality monitoring equipment, data compilation, and analysis. In cases where the acquisition of these data were never part of the program, EPA may have to submit a budget request to the OMB for the necessary funds; this additional funding may or may not be approved, which prolongs EPA's reliance on administrative measures and estimates of environmental condition. In general, as a program matures, there should be more opportunities to measure intermediate and ultimate environmental outcomes. In the case of long-term climate change, it can be difficult to measure effects of the environmental outcome given climate variability and other environmental changes. Although EPA may not be able to quickly achieve environmental results, the Agency should none-the-less plan a mix of short- and long-term measures.

This distinction may be important for Cambodia. There is nothing inherently wrong with using administrative and short-term measures; however, from the beginning of a program, agencies developing strategic plans should consider and include longer-term intermediate and ultimate environmental outcome measures. The process of developing longer-term measures can help the program better define its ultimate objectives. This can be adopted in the sector strategic plans in Cambodia; however, for budgeting purposes, the Budget Strategic Plan is a three-year rolling plan that needs program performance indicators over this period for budget allocation by MEF.

EPA's core air quality program⁴ provides an example of a mature program with intermediate and ultimate environmental outcomes. The intermediate environmental outcome is an emissions reduction, rather than a measured concentration in the air:

- ▶ Through 2018, maintain air toxics (toxicity-weighted for cancer) emissions reductions to 4.2 million tons from the 1993 toxicity-weighted baseline of 7.2 million tons.

⁴ For more information about EPA's air quality program, see <http://www.epa.gov/airquality/>.

For the most common air pollutant in the world, fine particles, an ultimate environmental outcome measure is an improvement in human health based on actual measurement of the particulate matter (PM) concentration in the air:

- ▶ By 2018, the population-weighted average concentrations of inhalable fine particles in all monitored counties will decrease to 9.5 $\mu\text{g}/\text{m}^3$ compared to the average of 10.4 $\mu\text{g}/\text{m}^3$ in 2011, a reduction of 9%.

3. CLIMATE CHANGE IN THE EPA PLANNING, MANAGEMENT, AND BUDGET SYSTEM

As climate change becomes increasingly important to environmental protection, EPA is explicitly incorporating climate change considerations into its planning, management, and budget system. As mentioned in the introduction, the evolution of this process started with President Obama's 2009 Executive Order 13514, which directed federal agencies to evaluate climate-related risks in order to ensure they can continue to meet their mission and serve the American public in the face of a changing climate. In its *Fiscal Year 2011–2015 EPA Strategic Plan*, the Agency began incorporating climate change impacts and adaptation into its mainstream planning processes (U.S. EPA, 2010). Then, in 2013, the President released a Climate Action Plan, with a key component of the plan focused on preparing the country to address the impacts of climate change (Executive Office of the President, 2013). In addition, EPA released its first-ever draft *Climate Change Adaptation Plan* for public comment in February 2013 and the final version in 2014 (U.S. EPA, 2014c). The EPA plan identified how climate change could affect EPA's ability to fulfill its mission, *to protect human health and the environment*, describing priority actions that EPA will take to ensure that its programs, policies, rules, and operations will remain effective under future climatic conditions (U.S. EPA, 2014c). The adaptation plan used EPA's strategic planning process to mainstream climate change adaptation across relevant Agency's goals through fulfilling the climate change adaptation strategic measures, as outlined in the EPA strategic plan (U.S. EPA, 2014c).

In this section, we describe how the climate change adaptation strategic measures have been mainstreamed within two of EPA's long-term strategic goals: *Addressing Climate Change and Improving Air Quality* and *Protecting America's Waters*. For each of these long-term strategic goals, we discuss the climate change adaptation strategic objectives and measures, how EPA's annual budget aligns with the strategic goals and objectives, and how EPA evaluates the performance of the strategic measures.

3.1. DEVELOPING THE STRATEGIC GOALS AND OBJECTIVES

As described in Section 2.1, EPA’s strategic plan sets long-term goals and objectives every four years to form the basis of the Agency’s priorities (in Cambodia this could be three years). Although climate change adaptation is incorporated across all of EPA’s strategic goals, this connection is most clearly articulated in the *Addressing Climate Change and Improving Air Quality* goal and the *Protecting America’s Waters* goal. For that reason, we will explore those goals in detail in this section.

3.1.1. GOAL 1: ADDRESSING CLIMATE CHANGE AND IMPROVING AIR QUALITY

This goal focuses on protecting public health and the environment by addressing indoor and outdoor air quality, pollution prevention, energy efficiency, industrial air pollution, pollution from vehicles and engines, radon, acid rain, stratospheric ozone depletion, and radiation protection (U.S. EPA, 2014c). Within this broad portfolio, EPA is focused on reducing vulnerability to future climate change to ensure the Agency can achieve its core mission (U.S. EPA, 2014c). For example, more frequent wildfires may increase PM and expose the public to PM pollution (U.S. EPA, 2014c). EPA will need to take into consideration more frequent wildfires as it continues to regulate PM pollution.

Under Goal 1, there are four strategic objectives:

- ▶ ***Objective 1.1 – Address Climate Change:*** Minimize the threats posed by climate change by reducing GHG emissions and taking actions that help protect human health and help communities and ecosystems become more sustainable and resilient to the effects of climate change. Note until recently, change in climate has not been considered by EPA in its regulatory programs.
- ▶ ***Objective 1.2 – Improve Air Quality:*** Achieve and maintain health- and welfare-based air pollution standards and reduce risk from toxic air pollutants and indoor air contaminants.
- ▶ ***Objective 1.3 – Restore and Protect the Ozone Layer:*** Restore and protect the Earth’s stratospheric ozone layer and protect the public from the harmful effects of ultraviolet radiation.
- ▶ ***Objective 1.4 – Minimize Exposure to Radiation:*** Minimize releases of radioactive material and be prepared to minimize exposure through response and recovery actions should unavoidable releases occur.

The first objective, *Address Climate Change*, is exclusively focused on climate change, with an emphasis on climate change adaptation. Three mechanisms within the *Address Climate Change* objective aim to mainstream climate change adaptation into EPA’s activities: (1) integrate climate change into scientific models or decision-support tools, (2) integrate climate change adaptation into financial mechanisms to encourage recipients to account for climate change, and (3) incorporate climate change adaptation into rulemaking processes and training programs to build the Agency’s and its partners’ adaptive capacity.

The mechanisms are different pathways the Agency can use to integrate climate change into ongoing programs and priorities.

Strategic measures associated with the *Address Climate Change* objective overlap other strategic goals and objectives. For example, the outcomes measured for these strategic objectives include the Climate Ready Estuaries Coastal Toolkit and Program Grant, which are aligned with the second goal, *Protecting America's Waters*. Table 1 describes the strategic goal, objective, and measures associated with climate change adaptation. Additional information about the strategic measures appears in Section 3.3.1.

3.1.2. GOAL 2: PROTECTING AMERICA'S WATERS

This goal focuses on protecting and restoring the nation's waters by protecting the quality of rivers, lakes, streams, wetlands, and coastal and ocean waters. Climate change can result in too much water, too little water, or changes in water quality; these changing conditions can adversely affect energy production and use, human health, transportation, agriculture, and ecosystems (U.S. EPA, 2014c). Within this goal, EPA's climate change work is largely focused on programs that will help stakeholders adapt to climate change, such as the Agency's WaterSense, Climate Ready Estuaries, Climate Ready Water Utilities, and Green Infrastructure programs. Here we provide an overview of the strategic objectives and an example of a strategic measure that relates to the Climate Ready Estuaries program.

Table 1. Examples of EPA climate change adaptation–focused strategic goals, objectives, and measures in the EPA strategic plans, FY 2014–2018^a.

Strategic goal	Strategic objective	Strategic measures ^b
Goal 1 – Addressing Climate Change and Improving Air Quality	Objective 1.1 – Address climate change	<ul style="list-style-type: none"> <li data-bbox="667 338 1425 527">▶ <i>Integrating climate change into decision-support tools.</i> By 2018, an additional 240 state, tribal, and community partners will integrate climate change data, models, information, and other decision-support tools developed by EPA for climate change adaptation into their planning processes, such as the Integrated Climate and Land Use Scenarios (ICLUS), the Climate Ready Estuaries Coastal Toolkit, and the Updated Climate Ready Water Utilities Toolbox. <li data-bbox="667 537 1425 726">▶ <i>Integrating climate change adaptation into financial mechanisms.</i> By 2018, 240 state, tribal, and community partners will incorporate climate change adaptation into the implementation of their environmental programs supported by major EPA financial mechanisms, such as the Climate Ready Estuaries Program Grant and the EPA/Federal Emergency Management Agency (FEMA) technical assistance to communities piloting climate adaptation projects. <li data-bbox="667 737 1425 850">▶ <i>Integrating climate change adaptation into training programs.</i> By 2018, six existing or new EPA-developed training programs will incorporate climate change adaptation planning for EPA staff and state, tribal, and community partners; this includes programmatic and cross-programmatic trainings.

a. The wording in this table is slightly different than the text because the table displays the strategic measures from the Fiscal Year 2014–2018 EPA Strategic Plan (U.S. EPA, 2014a), not the Fiscal Year 2011–2015 EPA Strategic Plan (U.S. EPA, 2010).

b. Specific information about the strategic measures with an explanation of results is provided in Section 3.3.

Source: Adapted from U.S. EPA, 2014a.

Under Goal 2, there are two strategic objectives:

- ▶ ***Objective 2.1 – Protect Human Health:*** Achieve and maintain standards and guidelines protective of human health in drinking water supplies, fish, shellfish, and recreational waters, and protect and sustainably manage drinking water supplies
- ▶ ***Objective 2.2 – Protect and Restore Watersheds and Aquatic Ecosystems:*** Protect, restore, and sustain the quality of rivers, lakes, streams, and wetlands on a watershed basis, and sustainably manage and protect coastal and ocean resources and ecosystems.

Several strategic measures associated with these two objectives relate to climate change. In Table 2, we highlight a strategic measure focused on restoring and protecting estuary habitat for Objective 2.2. Coastal wetlands and estuaries are vulnerable to the impacts of climate change associated with inundation and erosion as sea level rise accelerates and stressors to habitat and wildlife increase as water temperatures rise. Protecting additional estuary habitat can enhance the capacity of wetlands to migrate as sea levels rise and restoring existing estuary habitat can reduce other stressors on estuaries, such as invasive species and nutrient loads, also improving the capacity of habitats to adapt to climate stressors. To be sure, there does not appear to have been an adjustment in the quantitative goals for wetland protection based on the consideration of climate change.

Table 2. Examples of EPA climate change adaptation–focused strategic goals, objectives, and performance measures.

Strategic goal	Objective	Strategic measures
Goal 2 – Protecting America’s Waters	Objective 2.2 – Protect and Restore Watersheds and Aquatic Ecosystems	By 2018, working with partners, protect or restore an additional (i.e., measuring from 2012, forward) 600,000 acres of habitat within the study areas for the 28 estuaries that are part of the National Estuary Program

Sources: Adapted from U.S. EPA, 2010, 2014a.

3.2. INCORPORATING THE STRATEGIC PLAN INTO ANNUAL PLANS AND BUDGETS

As described in Section 2.2, EPA incorporates strategic goals and objectives into its annual budgets. Each year, EPA allocates budget to each goal and objective, as well as to specific programs, including climate change. In this section, we give examples of how EPA allocated the FY 2016 budget to various goals and objectives; we then discuss how the annual plans allocate funding to support specific priority projects for the Agency.

3.2.1. GOAL 1: ADDRESSING CLIMATE CHANGE AND IMPROVING AIR QUALITY

The annual FY 2016 budget for Goal 1, *Addressing Climate Change and Improving Air Quality*, is distributed across the goal’s four objectives (Table 3). The objective that focuses on climate change adaptation, *Address Climate Change*, is displayed in the first line; the other three objectives are shown to compare the budgets across the four objectives.

Table 3. EPA FY 2016 budget for Goal 1, *Addressing Climate Change and Improving Air Quality* (in thousands USD).

Objective	FY 2014 actuals	FY 2015 enacted	FY 2016 budget
1.1 Address Climate Change	\$182,744.1	\$190,665.3	\$279,469.7
1.2 Improve Air Quality	\$737,634.0	\$751,498.6	\$777,205.8
1.3 Restore and Protect the Ozone Layer	\$16,813.6	\$16,693.5	\$17,179.6
1.4 Minimize Exposure to Radiation	\$36,223.5	\$33,840.9	\$39,014.9
Total for addressing climate change and improving air quality	\$973,415.2	\$992,698.3	\$1,112,870.0

FY 2014 actuals is the actual funding spent in FY 2014 for each objective; *FY 2015 enacted* is the funding allocated to FY 2015 for each objective; and *FY 2016 budget* is the funding requested and submitted for congressional consideration in FY 2016 for each objective.

Source: Adapted from U.S. EPA, 2015.

Note that EPA is increasing the amount of funding for *Addressing Climate Change* each year at a higher rate than the other objectives associated with Goal 1. This increased budget reflects EPA’s commitment to implementing the President’s 2013 Climate Action Plan and the Agency’s prioritization of climate action (U.S. EPA, 2015). A key element of the Climate Action Plan that EPA supports is helping prepare

the country to address the impacts of climate change. Communities are on the front lines of preparing for and responding to changes in climate, such as extreme weather events, sea level rise, droughts, and wildfires. To support communities in adapting to these new realities, EPA is dedicating \$2 million to fund 20 full-time employees⁵ and resources for these employees to serve as Community Resource Coordinators to provide on-the-ground technical assistance to multiple communities to help “assess vulnerabilities, plan for climate change, and implement actions to increase resilience to climate impacts” (U.S. EPA, 2015, p. 18–19). These coordinators will help ensure that EPA resources and expertise are meeting community needs. Coordinators will work as a cross-agency, cross-goal, multi-media team to facilitate access for vulnerable communities to leverage the wide range of EPA programmatic expertise and resources in developing their own solutions (U.S. EPA, 2015).

3.2.2. GOAL 2: PROTECTING AMERICA’S WATERS

The annual budget for Goal 2, *Protecting America’s Waters*, is distributed across the goal’s two objectives. Table 4 displays the FY 2016 Presidential budget for the two objectives under Goal 2.

Table 4. EPA FY 2016 budget for Goal 2, *Protecting America’s Waters* (in thousands USD).

Objective	FY 2014 actuals	FY 2015 enacted	FY 2016 budget
2.1 Protect human health	\$1,259,075.3	\$1,268,811.5	\$1,573,250.7
2.2 Protect and restore watersheds and aquatic ecosystems	\$2,862,878.2	\$2,784,486.5	\$2,480,116.8
Total for protecting America’s waters	\$4,121,953.5	\$4,053,298	\$4,053,367.5

FY 2014 actuals is the actual funding spent in FY 2014 for each objective; *FY 2015 enacted* is the funding allocated to FY 2015 for each objective; and *FY 2016 budget* is the funding requested and submitted for congressional consideration in FY 2016 for each objective.

Source: Adapted from U.S. EPA, 2015.

Programs within EPA, such as the Water Program, are a combination of climate- and non-climate – related activities, and staff may split their time between these activities. In many of these cases, the EPA accounting system will not pick up this level of detail. As such, expenditures on climate versus non-climate efforts are mixed. For example, and as mentioned in Section 3.2.1, EPA is supporting communities in adapting to climate change by dedicating \$2 million to fund Community Resource Coordinators who will use these resources to provide on-the-ground technical assistance to improve community adaptation and resiliency in the face of climate change and extreme weather events. These Community Resource Coordinators will support Goal 2, *Protecting America’s Waters*, to facilitate access for vulnerable communities to EPA water programs and resources (U.S. EPA, 2015). Of the \$2 million

⁵ The 20 employees include 2 employees in each of the 10 Regional Offices.

dedicated to fund Community Resource Coordinators, it is unclear how much money will be allocated under Goal 1 versus Goal 2.

In addition, EPA will continue to implement several water programs that help stakeholders adapt to climate change in FY 2016:

- ▶ WaterSense is a key component of EPA’s efforts to ensure long-term, sustainable water infrastructure; reduce GHG emissions; and assist communities in adapting to drought and climate change.
- ▶ Climate Ready Estuaries works with the National Estuary Program to assess climate change vulnerability and develop and implement adaptation strategies. In FY 2016, EPA requested an additional \$5 million to award grants to projects that can increase climate resilience by protecting and enhancing wetlands.
- ▶ The Climate Ready Water Utilities initiative provides practical tools and training to enable water systems personnel to integrate climate variability into long-term planning.

The budget and tracking of these EPA water programs overlap between Goal 1 and Goal 2. For example, the Climate Ready Estuaries’ Coastal Toolkit and Program Grants costs are tracked under Goal 1, as shown in Tables 5 and 6; however, the associated acres of wetlands protected or enhanced are tracked under Goal 2, as shown in Table 7.

Table 5. Strategic measures and data for cumulative number of major scientific models and decision-support tools used in implementing environmental management programs that integrate climate change science data.

	FY 2011 ^a	FY 2012	FY 2013	FY 2014 ^b	FY 2015 ^c	FY 2016	Unit
Target	–	3	4	5	5	5	Major models and tools
Actual	0	3	4	7	–	–	

a. The FY 2011 baseline is 0 programs.

b. In 2014, the four scientific models and decision-support tools that integrate climate change science data included ICLUS, the Robust Decision-Making (RDM) tool, the Updated Climate Ready Water Utilities Toolbox, and the Climate Ready Estuaries Coastal Toolkit.

c. Data are not available for tracking the progress models and decision-support tools developed by EPA in FY 2015. In addition, data are not available to track the 240 partners that will integrate climate change adaptation into their planning processes as outlined in the *Fiscal Year 2014–2018 EPA Strategic Plan* (U.S. EPA, 2014a).

Source: Adapted from U.S. EPA, 2015.

Table 6. Performance measures and data for cumulative number of major grant, loan, contract, or technical assistance agreement programs that integrate climate change science data into climate-sensitive projects that have an environmental outcome.

	FY 2011 ^a	FY 2012	FY 2013	FY 2014 ^b	FY 2015 ^c	FY 2016	Unit
Target	–	1	2	3	3	3	Major programs
Actual	0	3	5	7	–	–	

a. The FY 2011 baseline is 0 programs.

b. In 2014, the five major grant, loan, contract, or technical assistance agreement programs that integrate climate change science data included Great Lakes Restoration Initiative Grants, Climate Ready Estuaries Program Grants, EPA/FEMA technical assistance to communities piloting climate adaptation projects, EPA Brownfield’s cleanup grants, and the Institute for Tribal Environmental Professionals (ITEP) grant.

c. Data are not yet available for 2015 or for tracking the progress of the 240 partners that will incorporate climate change adaptation into their EPA-supported programs, as outlined in the *Fiscal Year 2014–2018 EPA Strategic Plan* (U.S. EPA, 2014a).

Source: Adapted from U.S. EPA, 2015.

Table 7. Performance measures and data for acres protected or restored in National Estuary Program study areas.

	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Unit
Target	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	Acres
Actual ^a	125,410	89,985	62,213	114,575	127,594	93,557	–	–	

a. Actuals are acres protected or restored per year; this is not a cumulative measure. EPA notes that factors contributing to the number of acres protected and restored each year by the National Estuary Program’s network of programs and their partners are numerous and complex, making it difficult to accurately forecast with any degree of certainty.

Source: U.S. EPA, 2015.

3.3. TRACKING THE PERFORMANCE OF GOALS, OBJECTIVES, AND MEASURES

As described in Section 2.3, EPA uses its strategic measures to develop annual performance measures. EPA tracks data on the progress of the strategic performance measures and publishes these data each year. This section describes the performance tracking process for climate change adaptation strategic measures associated with the strategic plan’s Goal 1 and Goal 2.

3.3.1. GOAL 1: ADDRESSING CLIMATE CHANGE AND IMPROVING AIR QUALITY

As described in Section 3.1.1, three mechanisms help mainstream climate change adaptation into EPA’s activities: (1) integrating climate change into scientific models or decision-support tools, (2) integrating climate change adaptation into financial mechanisms, and (3) incorporating climate change adaptation into rulemaking processes and training programs. EPA tracks the performance of each of the three mechanisms on an annual basis. These measures show whether or not EPA met or exceeded its numeric objective.

EPA is working to build resilience to climate change by integrating considerations of climate data into major scientific models and decision-support tools. Table 5 displays the data for the cumulative number of scientific models or decision-support tools that integrate climate change science data. The data are administrative measures; it is relatively easy for the program to keep track of the major models and decision-support tools it develops and implements. This table shows that EPA met and exceeded its target in the *Fiscal Year 2011–2015 EPA Strategic Plan* (U.S. EPA, 2010) of integrating climate change impacts and adaptation into five major scientific models and decision-support tools by 2015.

As shown in Table 6, EPA is supporting climate change adaptation by integrating considerations of climate data into grant, loan, contract, and technical assistance agreement programs. Table 6 displays the data for the cumulative number of financial mechanisms that integrate climate change science data into climate-sensitive projects. Similar to the data above, these are administrative measures that are relatively easy to track. This table shows that EPA met and exceeded its target in the *Fiscal Year 2011–2015 EPA Strategic Plan* (U.S. EPA, 2010) of integrating climate change impacts and adaptation into three financial mechanisms by 2015.

Data tracking information on the progress of incorporating climate change into six EPA-developed training programs, as outlined in the *Fiscal Year 2014–2018 EPA Strategic Plan* (U.S. EPA, 2014a), is also not yet available.

3.3.2. GOAL 2: PROTECTING AMERICA'S WATERS

As stated in Section 3.1.2, EPA is building resilience to climate change by protecting and restoring wetland habitat. Table 7 displays the data for the protection and restoration of wetland habitat acres per year; each year, EPA has a goal of protecting or restoring 100,000 acres of habitat as part of the National Estuary Program. These data are environmental outcomes that are more difficult to track; however, they are not overly difficult or costly to collect. Each regional National Estuary Program likely reports estimates of acres of wetlands protected or restored from their projects; these estimates are aggregated by EPA's National Estuary Program office.

Unlike the *Addressing Climate Change* strategic objective, as described in Section 3.3.1, EPA did not meet its numeric objective of protecting or restoring 100,000 acres of habitat in 2010, 2011, or 2014. EPA indicated that it missed the target of 100,000 acres in 2014 because of delays in private landowner negotiations, coordination delays with multiple partners, permit and funding delays, and a decline in federal funding and subsequent state-matching funds (U.S. EPA, 2015). Even though in some years EPA

may miss its annual target, it may eventually exceed its long-term cumulative target because of the years in which it greatly exceeded its annual target.

4. ANALYSIS

In this section we focus on drawing lessons from EPA’s experience that may be able to inform the efforts in Cambodia.

4.1. WHAT ARE THE ACCOMPLISHMENTS OF THIS SYSTEM?

EPA’s planning, management, and budget system has enabled a number of accomplishments related to improved governance:

- ▶ **Mainstreaming climate.** Performance measures for climate adaptation activities are part of EPA’s strategic plan, as well as its annual planning and budgeting system. By incorporating adaptation into the strategic plan, annual plans, and performance measures, EPA made a strong commitment to implementing adaptation work. Once EPA incorporates programmatic activities into the strategic and annual performance plans, the Agency is held accountable for carrying out the work. If climate change adaptation was simply left as language in EPA’s *Climate Change Adaptation Plan*, adaptation commitments would be much less binding to the Agency’s offices. This may be the most important consequence of mainstreaming climate adaptation.
- ▶ **Transparency.** Before EPA began using strategic and annual plans, there was considerably less transparency about the Agency’s activities. Stakeholders and regulated entities understood the parts of EPA that were important to them, but it was difficult to see the “whole” of EPA – what the Agency was doing across all of its environmental programs. The new PBB system, required by statute (GPRA), created a much more transparent Agency. Now, all EPA strategic plans and annual performance plans are posted on the internet and are readily available to stakeholders, regulated entities, and the public.⁶ Transparency is one aspect of good governance because it enables ongoing improvement based on the needs of beneficiaries, and it simply allows the public to see what its government is doing.
- ▶ **Accountability.** Also for the first time, the strategic and annual planning efforts enabled EPA to create a new accountability system. Every year, major programs now have specific performance measures with numerical targets. Measures are appropriate for different phases of a program and address both short-and long-term success. This has transformed EPA because managers must meet specific performance measures for climate adaptation and mitigation.
- ▶ **More-strategic resource choices.** EPA’s transparent system of long-term goals and objectives, paired with short-term accountability, established a stronger justification for potentially moving budget resources to programming that is more likely to have environmental benefits. However, moving budget resources is still constrained, as Congress allocates the budget across major categories, and agencies have limited flexibility in changing these allocations. The rules of Cambodia’s system will likely be different than those in the U.S., but perhaps the PBB system may allow Cambodia to have more strategic resources choices as it did in the U.S.

⁶ See EPA’s historical planning, budget, and results reports available at <http://www2.epa.gov/planandbudget/archive#StrategicPlan>.

- ▶ ***Greater integration across programs:*** Cross-program workgroups are set up in association with various goals. These workgroups help develop strategic objectives, which require the efforts of different parts of the Agency to implement. Budget resources for some programs align with goals led by other programs. For example, EPA’s Strategic Goal 1, *Addressing Climate Change and Improving Air Quality*, is managed by the Office of Air and Radiation. However, the Office of Water and the Office of Research and Development also have programs that contribute to this goal. Thus, the budget resources to implement this goal come from a number of different programs across EPA. How to achieve the goal and identification of associated objectives and measures requires cross-program coordination. This coordination can lead to more efficient use of resources, as well as more integrated and useful end results.

4.2. WHAT ARE THE ONGOING CHALLENGES FACING THIS SYSTEM?

A number of continuing challenges face EPA’s planning, management, and budget system, including:

- ▶ ***Measures and targets are not always ambitious:*** EPA developed and provided training in development of performance measures. This training applies broadly to different environmental programs, and is not specific to climate change. But, program managers typically worry about losing resources. This translates into a fear of missing their targets for their performance measures, which can result in reduced budgets for the programs. This yields the potential for program managers to try to set only modest targets for their measures. Also, program managers do not always develop the most appropriate and relevant annual measures; instead, they develop measures that are easier to measure and do not require significant investments for new data. However, OCFO, OMB, and other external organizations review these measures and targets. In addition, external reviews are important in maintaining accountability, especially within a resource-constrained environment. The consequences of not meeting targets can be determined by EPA or OMB, and it is important to note that there is no specific formula for what might happen. A manager might receive criticism during a performance review or OMB might consider reducing the program’s budget a little. This is the reason managers do not want to be too ambitious – they are far more likely to be criticized for missing targets and will rarely be rewarded for being ambitious. Also, as discussed below, the identification and implementation of measures and targets appropriate for adaptation poses a challenge for EPA and others.
- ▶ ***Aligning the budget with performance has practical challenges:*** Another challenge is aligning budget resources with the detailed sets of annual activities and measures. EPA’s first strategic plan was developed on top of an existing budget accounting system, which was created by environmental statutes that can only be changed through legislation. Nonetheless, the system created greater transparency. This may be similar to other countries, where country-specific constraints on budgets will affect how climate considerations can be integrated or mainstreamed with existing systems. A carefully designed PBB system can provide a basis for future budget decisions that allocate more resources to more serious problems. An important matter for the RGC in implementing an effective PBB system is ensuring the system improves the information for potential shifting of resources across programs to reflect greater achievement of environmental outcomes. These shifts are not done automatically, it requires active engagement of senior management within a Ministry. But for climate change, this could be a path toward a greater reduction in vulnerability to climate risks. With the new Cambodian system of full

program budgeting aligned with budget entities,⁷ it is expected that there will be opportunities for budget holders to shift resources among components within a program or indeed between programs themselves under the budget entity who has the responsibility.

- ▶ ***An effective PBB system requires sufficient staffing***⁸: The EPA planning, management, and budget system is labor intensive. Fortunately, EPA is a mature agency with sufficient central office staff to lead and manage this process. In addition, EPA has a central, although small, staff within the Office of the EPA Administrator that is dedicated to promoting adaptation across all of the Agency's programs. Central staff do not have any direct authority over the core EPA programs; however, central staff have some resources they can contribute to Program Offices to encourage them to develop adaptation activities that will support strategic plan objectives. Capacity is relatively low for PFM RP in Cambodia (as reported by the External Advisory Panel of the PFM RP in June 2015); therefore, integrating adaptation across core programs will need an intense training program for staff.
- ▶ ***An effective PBB requires sufficient data and information***: If there is an outcome that can be measured and insufficient environmental information for Cambodia to develop climate-based measurable objectives, then the government needs to make plans to acquire this information. One approach is to develop new objectives that describe a plan to develop or acquire Cambodia-specific data and information. Any objective like this should have performance measures that track progress in data and information acquisition.
- ▶ ***The integration of climate change should build on development of the PBB system and can take time***: EPA developed its strategic and annual planning system, as required by GPRA, for many years before beginning to integrate climate concerns. By the time climate change was beginning to be integrated, the Agency already had considerable experience developing the PBB process. Starting out to build such a system for the first time will take time, offer challenges, and yield imperfect results. However, agencies often have opportunities to build on and improve the system in later years. The Cambodian government is piloting PBB across 10 ministries in FY 2015 and a further 6 ministries in FY 2016. This will enable this ministry to replicate what has been done in the pilot ministries and rapidly and efficiently build its PBB process for FY 2017.
- ▶ ***Measures for GHG mitigation are more established than measures for adaptation***: GHG emissions can be compared using common metrics such as tons of carbon dioxide equivalent. There does not appear to be a common or universal metric for measuring adaptation across different sectors. For example, a broadly accepted metric or set of metrics to compare adaptation across sectors as diverse as water resources and human health, or water resources and biodiversity, does not exist to our knowledge. EPA has been working to reduce GHG emissions through a number of programs, such as *Energy Star*, for quite a few years. As a consequence, the Agency was able to develop outcome measures for GHG emissions reductions long before it even began to address adaptation. A good example of an intermediate environmental outcome measure for GHG reductions was highlighted in Figure 4. The challenge, then, is for agencies to

⁷. The adoption of full program budgeting and budget entities will not apply to this ministry until FY 2017.

⁸. Approximately 40–80 EPA staffers work on the EPA PBB system full-time, with the majority being budget analysts. Several other EPA staffers contribute to implementing the PBB system on a part-time basis. This probably means that the annual costs of implementing the PBB system are in the range of \$10 million. EPA has a current workforce of just over 15,000 staffers and an annual budget of about \$8 billion (USD).

establish equivalent, defensible measures for adaptation. This challenge in establishing useful and meaningful adaptation measures goes well beyond EPA's experience.

- ▶ ***Measures may evolve over time:*** Evaluating changes in resilience to environmental and human health, based on EPA's actions, may require distinct types of measures that come into play at different times as a program matures. For example, early measures may reflect *enhancing capacity*, such as increases in the "number of partners taking formal training to increase their awareness of the importance of adaptation planning" (U.S. EPA, 2014c, p. 58). Building on this knowledge in later stages, measures may reflect *changes in behavior*, such as an increase "in the use of decision-support tools to integrate climate adaptation planning into state and local planning activities..." (U.S. EPA, 2014c, p. 59). For more mature programs, long-term measurement efforts may require measures for *changes in state or condition*, such as improvements "in the ability of communities to withstand more frequent and intense storm events..." (U.S. EPA, 2014c, p. 59). The need for these "waves" of measure types adds complexity to an agency's accountability efforts.
- ▶ ***Ongoing, consistent evaluation of performance measures is required:*** EPA reports annually on its performance against its strategic measures, and this ongoing evaluation allows the Agency to learn what worked and why, and what did not work and why (U.S. EPA, 2014c). This enables EPA to assess the effectiveness of ways to mainstream environmental objectives into its programs, policies, rules, and operations (U.S. EPA, 2014c). Based on these lessons, EPA could adjust its strategic goals, objectives, and measures to more effectively integrate climate change adaptation into its activities. OMB also evaluates the Agency's performance, which compels EPA to maintain consistent measures. Also note that while consistency is desirable in order to measure performance over time, as noted immediately above, a key component of EPA's PBB system is the ability to adjust measures as appropriate.

Despite these challenges, EPA's planning, management, and budget system incorporated a level of transparency and accountability, which simply did not previously exist at the Agency. Furthermore, the system allows for integration of new environmental concerns, such as climate change.

5. PRELIMINARY RECOMMENDATIONS

Incorporating climate considerations into Cambodia’s PBB system will require a number of steps. In this section, we outline several preliminary steps to modify and adapt the EPA planning, management, and budget system for use in Cambodia. These preliminary steps were useful in building the EPA system. However, the authors of this paper are not experts in Cambodia’s current PBB efforts; as such, we provide preliminary steps that were valuable for incorporating climate change adaptation into EPA’s planning, management, and budget system. We are not able to assess whether these steps are applicable in Cambodia or to what degree they should be modified to fit Cambodia’s PBB and governance situation.

Step 1: Identify the ministry or ministries and staff to mainstream climate change adaptation into the PBB system

Based on our understanding, the Ministry of Finance (MoF), in coordination with the MEF, will lead the development of PBB. In addition, the MEF, with support from MoE, will integrate climate change into the PBB.⁹ Line ministries, such as the Ministry of Agriculture, Forestry, and Fisheries (MAFF), will also be critical in integrating climate change into sector-specific PBB systems. These ministries need to identify the key technical and management staff that can work together to synthesize the existing climate knowledge base, as outlined in Step 2, and develop the structure for including climate change adaptation in the PBB system, as outlined in Step 3.

In the short- to medium-term, the ministries will need to train existing staff to develop their capabilities in integrating climate change into day-to-day thinking, such as systematically considering climate change impacts in budget submissions. Key staff might include¹⁰:

- ▶ ***Technical support staff*** who understand climate change impacts in Cambodia and the appropriate climate change adaptation efforts to reduce those impacts. These staff members will primarily focus on identifying, evaluating, and selecting the strategic goals, objectives, and

⁹. This differs from the U.S. government approach in that EPA did not support other agencies (or vice versa) in mainstreaming climate change into its system. Instead, EPA interacts with OMB to develop and implement its own budget.

¹⁰. At this point, we are unable to provide more specific details about the number of people in each ministry who would dedicate their work to climate change; the capacities needed at these ministries to integrate climate change into the PBB system; and the inter-ministerial structures that might need to be built to support this process.

measures that will integrate climate change adaptation into the RGC's long- and short-term activities and budgets.

- ▶ **Budget support staff** who understand the current budgeting process and can formulate a process for allocating funding to the climate change adaptation goals, objectives, and measures.
- ▶ **Senior staff** who manage the technical and budget support staff to efficiently integrate climate change adaptation into the PBB system. Senior staff may also be charged with communicating the approach and the importance of integrating climate change into the PBB system to the public, the RGC, and other governmental ministries.

External stakeholders might include representatives of the public – such as regional representatives, nongovernmental organizations, civic society, and the private sector – who are involved in consultations on the process of integrating climate change adaptation into the PBB system. Allowing for opportunities for public comment is critical to building support for this process, as well as building a process that is transparent and accountable.

Step 2: Synthesize the technical climate change adaptation information

In recent years, Cambodia developed a comprehensive plan for its climate change response (Royal Government of Cambodia, 2013a), as well as the corresponding plans in many key sectors. This existing knowledge base, as well as knowledge gained from ongoing climate change projects and studies in Cambodia, should be synthesized and used to develop a broad consensus on how to align national development goals and priorities with climate change adaptation needs. Synthesizing existing knowledge will allow staff to develop the essential goal or goals, objectives, and measures that should be incorporated into the PBB system.

It is important to take aspirations, such as making Cambodia more “climate resilient,” and develop a set of measurable objectives to be achieved over a defined time horizon. Broad strategies and approaches must be turned into specific detailed environmental objectives, and these objectives have to be realistic (e.g., based on available resources). Turning broad strategies into specific, actionable objectives requires a series of well-planned, facilitated meetings with technical specialists to define the objectives and program activities, and budget specialists to define realistic budgets for these activities.

Ultimately it is quite challenging and perhaps even impossible to clearly define an end state of what is a resilient country. Resiliency is a vague term and as far as we can tell, is difficult to clearly define and measure. Like vulnerability, it is a relative term. It is generally possible to ascertain whether measures increase or decrease resilience. It may not be possible to assess the adequacy or sufficiency of such

measures. This is contrast to mitigation where we can define a goal (e.g., reduce GHG emissions by 50–80% by mid-century) and measure progress toward achieving that goal.

To assist with evaluating and synthesizing the technical information and building general agreement on climate change adaptation needs in Cambodia, the MoF – in close consultation with MEF, MoE, and other line ministries – should consider developing an internal and external review and consultation process. A review and consultation process can provide the ministries with additional insight and expertise for developing the goals, objectives, and measures and developing budgets to meet these objectives and measures. And this process can ensure that existing processes such as the National Adaptation Plan are properly accounted for during system development. In addition, a review and consultation process can build support for mainstreaming climate change adaptation into the PBB system.

Step 3: Develop the “structure” or “architecture” of mainstreaming climate change adaptation into the PBB system

Determining the appropriate structure or architecture for mainstreaming climate change adaptation into the PBB system is critical. If the RGC follows the EPA approach, as outlined in this paper, then line ministries will need to develop a limited number of quantifiable objectives with short-term measures that track activities, and long-term measures that track intermediate and ultimate environmental outcomes. The proposed objectives should be reviewed by MEF and MoE. In addition, the ministries will need to propose budgets that are explicitly linked to these climate change adaptation objectives, which will also be subject to review by MEF with MoE providing technical advice. We briefly outline this process below, and provide an example from the agricultural sector of how the ministries might undertake this process.

- ▶ ***Develop a limited number of quantifiable objectives.*** Each objective should include specific activities and have a defined time horizon.

In the *Climate Change Priorities Action Plan for Agriculture, Forestry and Fisheries Sector 2014–2018*, the MAFF identified several climate change impacts on the agricultural sector, and indicated that a proposed key action for Cambodia is promoting climate-smart farming systems that are resilient to climate change (TWG-CCAFF, 2014). In the description of this key action, MAFF states that this action is designed to “promote and scale up existing crop options that are tolerant to flood and drought...” (TWG-CCAFF, 2014, p. 42). This proposed action could be turned into an objective, such as: *By [year to be inserted], develop and make available economically important crops that are resilient to climate change impacts of flooding and drought.*

In Section 3 we described the major EPA climate programs. In EPA's Goal 2, *Protecting America's Waters*, climate change is not typically the "headline." But not accounting for climate change and the role for climate change adaptation could result in a number of these programs failing. So EPA has a number of activity-based performance measures to hold itself accountable to carry out climate adaptation. And in some of these cases the budget expenditure is clearly labeled as climate adaptation; however, in other cases it is difficult to separate climate expenditures from regular program expenditures. This is yet another reason that tracking performance through appropriate measures is so critical.

Develop measures for each objective: Each objective should have shorter-term measures that track activities and longer-term measures that track intermediate and ultimate environmental outcomes. It is likely that some form of training should be provided so that staff can develop a logical chain of program activities to their eventual environmental outcomes that would form the basis for performance measures. In fact, EPA provides online training for the use of logic models to assist with this process.¹¹ For the proposed objective – *By [year to be inserted by the project team], develop varieties of economically important crops that are resilient to climate change impacts of flooding and drought* – MEF with MAFF and MoE – could develop several shorter-term, administrative measures and longer-term, environmental measures, such as:

- *Administrative outputs:* By [year to be inserted], 10 economically important crop varieties that can be modified to tolerate droughts or flood events will be identified
- *Administrative outcomes:* By [year to be inserted], one new biotechnology laboratory will be developed that can create new drought- or flood-tolerant crop varieties
- *Intermediate environmental outcomes:* By [year to be inserted], five drought- or flood-tolerant crop varieties will be tested under extreme drought or flood conditions
- *Ultimate environmental outcomes:* By [year to be inserted], three drought- or flood-tolerant crop varieties that can be grown for commercial production will be made available for commercial use.

- ▶ ***Develop budgets that meet the objectives:*** Climate change adaptation objectives must be explicitly linked to proposed budgets.

In the *Climate Action Plan*, a preliminary budget is associated with the proposed key action of promoting climate smart-farming systems (TWG-CCAFF, 2014). For this action, MAFF

¹¹. For additional information on a logic model, see <http://www.epa.gov/evaluate/lm-training/index.htm>.

allocated an annual budget of \$2.694 million (USD) from 2014 through 2018, for a total of \$13.47 million (USD; TWG-CCAFF, 2014). This budget could be scaled appropriately to align with the objective – *By [year to be inserted], develop economically important crops that are resilient to climate change impacts of flooding and drought – and undertake the performance measures associated with this objective.*

The existing climate change problems in Cambodia and climate change adaptation options to address those problems is, to a significant extent, captured in Cambodia’s comprehensive strategic plans for climate change, as well as corresponding key sector plans. Using this information to incorporate climate change adaptation into Cambodia’s PBB system can ensure that budgets are developed to provide the resources to address these problems, and can ensure strategic and accountable governance to address current and future climate changes. It is important to incorporate this information into the PBB. Leaving these strategies outside of the system runs the risk that their implementation is neglected. EPA’s experience reflects this problem. EPA adaptation program staff understood this problem and successfully worked to integrate climate change adaptation into their PBB system.

In conclusion, there is no magic formula for incorporating climate change adaptation into the PBB system. EPA’s PBB process can be evaluated over time, and improvements can be made to ensure that budgets support the most important objectives and the performance toward meeting the objectives is tracked by more quantifiable measures. Developing a process that can evolve and be improved over time is critical when tackling climate change.

A final thought is moving ahead to develop climate change performance measures, even if they are imperfect and will need improvement and revision. This is far preferable to delaying the process in search of the “perfect” set of measures. Indeed, it is our understanding that the RGC is moving ahead on identifying and implementing climate change adaptation measures. We applaud this effort.

6. NEXT STEPS

To provide a path forward, we offer several immediate next steps for integrating climate change into Cambodia's PBB system:

- ▶ This analysis focuses on the integration of climate change into EPA's planning, management, and budget system. EPA is one U.S. government agency that integrated climate change considerations into its system. To broaden this analysis, we can examine the integration of climate change adaptation into other U.S. government departments or agencies. Broadening the analysis will provide additional examples of approaches to integrating climate change into PBB systems, including budgeting systems, as well as a broader range of goals, objectives, and measures that may be useful to Cambodia. In particular, we could examine how sector agencies such as the U.S. Department of Agriculture are incorporating climate change.

To provide more detailed information about structuring the Cambodian ministries to integrate climate change into the PBB, we can work with Cambodian experts to better understand the Cambodian PBB system, the current structure, the size and budgets of ministries, and the internal and external processes that the ministries might be able to utilize to integrate climate change into its PBB system. A better understanding of the Cambodian system will help us offer advice regarding the capacities needed at these ministries to integrate climate change into the PBB system, and the inter-ministerial structures that might need to be built to support this process. Initial steps would include capacity building, synthesizing existing climate information into a form that can be incorporated into the PBB, and training in performance measurement and budget alignment to improve long-term planning and management of climate adaptation in Cambodia.

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