

Quarterly Progress Meeting Template

To be prepared by an Outcome's lead GIT in advance of its Quarterly Progress Meeting

Step 1: Summarize your outcome.

Outcome: Land Use Methods and Metrics Development Outcome

This Outcome has three parts:

1. Monitoring the conversion of farmland, forests and wetlands every two to five years; Assessing the rate of impervious surface change every two to five years;
2. Quantifying the impacts of land conversion on water quality, healthy watersheds and communities; and
3. Communicating results to the public, elected officials and Chesapeake Bay Program partners.

Lead and Supporting Goal Implementation Teams (GITs):

Our lead is the Water Quality Goal Implementation Team (WQGIT) with participation of the Healthy Watersheds GIT and Habitat GIT. The Land Use Workgroup under the WQGIT has been advising on this Outcome since its inception. Unlike some of the other Outcomes that rely on Partner actions to accomplish, this outcome is completely internal to the CBPO because no jurisdiction- besides perhaps Maryland- has an approach to monitor land use/cover change at a scale and level-of-accuracy relevant to local governments.

Participating Partners:

- Chesapeake Bay Commission
- Local Government Advisory Committee
- Maryland Department of Planning
- Pennsylvania Department of Community and Economic Development
- U.S. Geological Survey
- USGS National Geospatial Program
- The Chesapeake Conservancy

Progress:

There are several possible approaches for fulfilling this outcome, none of which have yet been fully implemented due to the loss of CBP staff and the "all-hands-on-deck" call for the Mid-Point Assessment. The same call for Phase III WIP support has tapped out the Land Data Team and the Land Use Workgroup (LUWG). That said, the LUWG acknowledges that this is a very important Outcome, relevant to many other Outcomes, and to the validation of Land Policy BMPs associated with Phase III WIPs and the "accounting for growth" TMDL expectations. The LUWG plans to refocus attention on this Outcome once each state's Land Policy BMPs are run through CAST, which should be accomplished by the end of October 2018.

Progress on specific management actions:

- 1.1 Design a manual, stratified sampling approach at the county level and assess land cover change from high resolution imagery circa 2005-2013.**

- Research on sampling approaches was begun by Quentin Stubbs (CBP-USGS) in 2015 but was never completed due to the redirection of his time on developing the Phase 6 land use data.

1.2 Assess land use change throughout the entire Bay Watershed from 1984-2011 using the P6 land use database and the National Land Cover database.

- Done. Data tables were produced and analyzed.

1.3 Assess difference in high resolution land cover maps at the County level.

- Done for Prince George's county (2009 – 2013), the only county in the watershed where such data exist. A full analysis of the data was abandoned after realizing that two independently created high-res land cover datasets cannot be accurately differenced. Change detection techniques are needed to measure change with precision and accuracy.

1.4 Conduct a literature review on high resolution land cover change methods. (Unfunded FY 2016 GIT Funding proposal)

- This was part of an unfunded FY 2016 GIT proposal. Initial research was conducted by the LUWG staffer but not continued or completed due to alternative priorities.

2.1 Quantify impact of land conversion on water quality (explaining changes in nutrient and sediment that relate to monitored and modeled land conversion)

- The water quality implications of future land use scenarios have been assessed using the latest version of CAST and 2017 Progress v9 Best Management Practices. These results have been reviewed at the state level by the LUWG. LGAC and the LUWG hosted a day-long workshop on developing future land use scenarios in June 2017. Over ten presentations have been made to conservation organizations and the jurisdictions on the value of conservation to water quality and how to incorporate conservation into the Phase III WIPs.

2.2 Quantify impact of land conversion on healthy watersheds and Habitats

- Future land use scenarios are being used to assess the potential vulnerability of healthy watersheds and high-priority lands for conservation (determined by the Chesapeake Conservation Partnership).
- While there are off-the-shelf thresholds that can be used to assess general impacts to habitats and watersheds (e.g., % impervious cover or % forest cover). There is a broad range of environmental response to land use change that these simplified thresholds ignore. Relating land use change to watershed health requires additional research and the integration of land change and water quantity and quality and habitat data.

2.3 Quantify impact of land conversion on communities

- Not started. Some progress has been made on Part 2. CAST has enabled us to make progress on quantifying the water quality implications of land use change. However, we don't yet have a method for assessing co-benefits/detriments from land conversion nor have we fully explored the secondary impacts of development (tail-pipe emissions, fine-particulates/asthma, road construction and widening, energy consumption/production, and

water consumption). The Chesapeake Bay Land Change Model has been helpful to assess the vulnerability of healthy watersheds to land conversion but we still don't have a well thought out and balanced approach to assess impacts to communities (e.g., flood and food security risks, costs to local governments, benefits to the tax base, environmental justice).

In summary- it's probably just a matter of time- perhaps another year or two- to master parts 1 and 2 (except for wetlands and assuming that Objective #1 of the Chesapeake Conservancy's Cooperative Agreement with the EPA-CBPO remains fully funded). We're resource and leadership constrained in addressing part 3. The Healthy Watershed GIT may want to take the lead on these parts 2 and 3.

Step 2: Explain the logic behind your work toward an Outcome.

The logic behind this outcome involves monitoring (land use change), assessment and evaluation (impacts to water quality, habitats, and communities; evaluation of land change metric accuracy), integration of monitoring results with Land Use Evaluations Outcome, and communication of both outcomes to the CBP Partners. The results of the assessment and evaluation phase will dictate whether the metrics themselves or the characterization of impacts need to be re-evaluated to improve accuracy or relevance.

Step 3: Craft a compelling narrative.

What are our assumptions?

We assumed that internal and external resources would be available to complete the work and analyses needed for this outcome. Challenges associated with finalizing the Land Image Analyst tool coupled with a 2-year delay by USGS on release of their national annual land cover data and internal burdens associated with the Mid-Point Assessment and Phase III WIP development have delayed progress on this outcome. These challenges were all unforeseen when drafting our original workplan.

Are we doing what we said we would do?

No, we are not on track. We have made limited progress on management actions 1.1, 1.2, 1.3, 1.4, 2.1 and 2.2 with the help of CBP staffers and on "as time allows" basis. To make more progress, this Outcome requires freeing up CBPO GIS Team resources or securing additional staff or staffers to work on it.

Awarding the recent EPA-CBPO Cooperative Agreement with the Chesapeake Conservancy is the most action relevant to future progress. This Award calls for repeat high-resolution land cover/use mapping every 4-5 years which will fulfill Management Approach #1. Continued full-funding of Objective #1 in this Award is critical to this Outcome's success.

The USGS will be releasing the 16-class National Land Cover Dataset for 2001, 2006, 2011, 2013, and 2016 in December 2018. Also in December, USGS plans to release an annual 7-class land cover dataset nationwide covering the period 1985 – 2017. The CBPO Land Data Team is in the process of evaluating these data for CBP use but currently- neither are accurate enough to independently fulfill this Outcome.

The Chesapeake Conservancy is closest to developing a more accurate metric of land cover/use change. They are working with Microsoft to identify hot spots of landscape change at 1m resolution. This is promising but only includes 4 classes: trees, herbaceous, barren, and water. In combination with USGS' Landsat-derived land cover products, the Chesapeake Conservancy and USGS may be able to provide

what we need to monitor change every two years which will complement wall-to-wall remapping of the watershed every 4-5 years at 1m resolution.

USGS and the USFS have also developed a tool called the “Land Image Analyst” which can be used for citizen sampling of landscape change at a county level. This tool has been in development since 2013 and is currently in its final stage of beta testing. However, given the significant amount of CBP staff oversight required for broad public dissemination and use of the “Land Image Analyst” tool, it seems to hold less promise than the other above-mentioned efforts. None of the above approaches will sufficiently address wetland change and there is not yet known a cost-effective means of tracking change across all wetland types (e.g., tidal emergent, forested, etc.).

Fulfilling Management Approaches 2 (Impacts) and 3 (Communication) depend on the successful completion of Management Approach 1 (Monitoring).

Are our actions having the expected effect?

Quantifying the nutrient and sediment effects of land conservation and land use planning actions for the Phase III WIP development has indicated that the water quality effects of these actions are minimal in the near term relative the nutrient reduction targets established for each jurisdiction. Moreover, solely focusing on water quality provides no incentive to protect farmland from development because doing so typically results in negative water quality consequences.

Land use planning and land conservation actions are critical for maintaining TMDL-mandated pollution reductions in perpetuity and their value only increases over time. In contrast, the effectiveness of engineering practices can decrease over time while their costs increase. To incentivize better land management and conservation, the co-benefits of these actions need to be fully quantified and a new framework is required to demonstrate their value (not solely relying on the TMDL). The three-phase Forest Retention study lead by the Healthy Watershed GIT holds promise for quantifying some of the co-benefits throughout the watershed.

How should we adapt?

The CBP Partners should consider putting on hold the wetland monitoring component of this Outcome unless a significant influx of funds is anticipated. Alternatively, the CBP Partners could restrict the geographic extent or type of wetlands analyzed (e.g., focus only on change in tidal wetlands along the Bay shoreline). Impacts of land use change to habitats – including Brook Trout and Black Ducks- and to the health of watersheds (beyond just vulnerability measures) needs leadership and guidance.

The Stewardship, Habitat, and Healthy Watershed GITs should work collaboratively on a qualitative description of the impacts of land use change on communities, habitats, and watersheds and on a synthesis of literature and studies pertaining to land use change impacts.

This Outcome has relevance to most of the Outcomes in the 2014 Bay Agreement. It's been on hold due to the Mid-Point Assessment but could, and probably should, become one of the top priorities of the Partnership outside achieving the TMDL. USGS and the Chesapeake Conservancy are key Partners needed to complete this outcome but so is the CBPO GIS Team. To date, the GIS Team has assumed many duties that logically should be the responsibility of EPA Region 3 or the States (e.g., updating MS4s, protected lands, sewer service areas, etc.). This situation needs to change so that the GIS Team can focus on supporting this and other important Outcomes.

To foster the completion of this outcome, the Management Board could:

- Delegate the updating of MS4, protected lands, sewer service areas, and other jurisdiction specific datasets needed for the TMDL to the jurisdictions- providing them with update deadlines and soliciting high-level commitments from state agency leaders to meet the deadlines. EPA Region 3 could also assist in this process. This will help free-up CBPO GIS resources to work on this outcome.
- Adjust the outcome language to extend the completion date to December 2021.