



Climate Resiliency Workgroup

August 15th, 2024

1:30 – 3:30 PM EST

Event webpage:

<https://www.chesapeakebay.net/what/event/climate-resiliency-workgroup-meeting-august-2024>

Minutes

Workgroup Action Items

- Elizabeth Andrews offered to share her Community Resilience Best Practices Guide and the executive summary she is drafting and welcomes any feedback from workgroup members
- Ray Najjar and his team are looking for letters of support for Phase 2 proposal of the saltwater contamination tool. Breck Sullivan offered to help with a letter of support from STAR. Others can reach out to Ray at rgn1@psu.edu

Partner-to-Partner Action Items

- Keely Maxwell offered to set group/organization trainings on the Equitable Resilience Builder and to reach out to her if interested (maxwell.keely@epa.gov).
- Ray Najjar follow-up with Nicole Carlozo on potential use cases of saltwater contamination tool related to marshes and available tidal wetland forecasts.

1:30 PM **Welcome, Opening Remarks, and Announcements – Mark Bennett, Co-Chair (USGS), Jackie Specht, Co-Chair (MD DNR) and Julie Reichert-Nguyen, Coordinator (NOAA) [10 minutes]**

Focus of meeting:

- *Partners will be sharing updates on climate resilience related efforts for workgroup awareness and/or feedback*
- *Management Board Adaptation Outcome Progress Presentation Update*
- *GIT-Funded Marsh Adaptation Project Update*

Workgroup Announcements:

- *Kyle Hinson and his co-authors recently published a paper in **Scientific Reports** regarding future projections of Bay hypoxia and the sensitivity of the results to different methodologies. To read the article, [click here](#).*

- The Chesapeake Research Consortium is accepting applications for the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team Staffer. Applications are due by August 25th, 2024. For more information, [click here](#). Please share with your networks!
- [NOAA Citizen Science Community of Practice Notice of Funding Opportunity](#): NOAA announced the \$600,000 funding opportunity for members of the public to conduct science that helps fisheries and fishing communities prepare for climate change. As the lead for this project, NOAA Fisheries will accept proposals for citizen science projects that help improve stock assessments or contribute to our understanding of how our fisheries and fishing communities may be impacted by changing environmental conditions. This funding will support three to eight different projects at approximately \$75,000 to \$200,000 per project from fiscal year 2025 to 2026. **Proposals are required and are due by November 4, 2024 at 11:59 p.m. Eastern Time. Applicants are also asked to submit an optional Letter of Intent by September 5, 2024.**

There will be an [informational webinar](#) on **August 13th, 2024 from 3:00 PM – 4:00 PM.**

- On July 1, 2024 the draft [A Critical Path Forward for the Chesapeake Bay Program Partnership Beyond 2025](#) was released for public feedback. Anyone can submit public feedback, so you are encouraged to share this email with your networks and colleagues. A list of frequently asked questions about the process and how to comment can be found at <https://www.chesapeakebay.net/what/publications/beyond-2025-public-comment-faq>

Feedback will be accepted until 11:59 p.m. on August 30, 2024 and only via email to comments@chesapeakebay.net. Comments will not be responded to individually, but a red-lined version of the draft will be available, as well as all feedback received. You are encouraged to group your feedback into the following categories: Science, Restoration and Conservation, Partnership, Chesapeake Bay Watershed Agreement and Miscellaneous. If you submit feedback and do not receive an acknowledgement that they were received within 48 hours, please send them again!

Summary

Elizabeth Andrews had a partner update about her current effort around developing a best practices guide for developing a framework for engaging communities on the topic of community resilience. She presented on this effort at the CRWG's March Meeting and solicited

feedback from the workgroup at the Community Resilience Working Meeting. She highlighted the revisions she made to the framework, which includes five steps for how to engage with communities. This information is published on their website, along with a “how to use this guide” page, legal considerations, tools and resources, and case studies. She commented that she would like further feedback about how best package high-level summaries of this effort. Julie commented that she liked the idea of an executive summary and added that she would be happy to send it to the workgroup for review. Elizabeth also commented that they will have a form for folks to fill out if they have any feedback on the guide, and she welcomes any insights from the workgroup.

1:40 PM [EPA’s Equitable Resilience Builder](#) [Maureen Shacklette, Marissa Matsler, & Keely Maxwell, EPA] (40 Minutes)

Emily and Keely will present on EPA’s [Equitable Resilience Builder](#), which is an application that supports communities in resilience planning with a focus on equity. It engages users in a guided process to inclusively assess local hazards, equity, and the resilience of build, natural, and social environment systems.

Summary

Keely started the presentation on the Equitable Resilience Builder (ERB), by polling the meeting participants about what their biggest challenge is with respect to equity and resilience in their particular region or organization. Most folks responded that their biggest challenge is limitation in time, labor, and resources (*see slide 1*). The second biggest challenge that was identified is “not knowing how to move forward in a concrete way.”

They presented a [StoryMap](#), which provided an overview about how the tool has already been used in watershed resilience planning by the Lower Grand River Organization of Watersheds (LGROW). LGROW hosted three workshops with communities in different sub-watersheds, where they used ERB to inform discussions and activities around resilience planning. This effort helped identify community needs and priorities, so they could incorporate community input in their planning efforts. Keely then added that the results from this effort were then used to refine the ERB.

Keely provided some background about the development of the ERB, which is a downloadable tool for inclusive resilience planning for disasters and climate change. The primary reason for making this tool is that they have heard feedback from resilience planners and professionals from various organizations that knowing how to approach incorporating equity into their resilience work has been a challenge. She commented that the tool is intended for folks who might not have a lot of capacity and resources or who have varying levels of technical knowledge. Intended end-users of the tool include local, state, federal agencies, emergency managers, land-use planners, and community organizers. ERB helps with engaging community groups and agencies around the topic of building equitable resilience through assessing local hazards and identifying and evaluating actions that support resilience. She then underscored that this tool was created to address the disproportionate impacts that marginalized communities experience as a result of climate change. She commented that these disparate

impacts need to be taken into account in resilience planning. She also added that the tool helps to avoid inequitable impacts of resilience projects. She then reviewed the structure of the tool, with focus on how equity is integrated into every step of the process and highlighting how the tool is customizable.

Marissa and Maureen then provided a demonstration of ERB and how to navigate the tool. Marissa commented that each section has a list of activities that end-users can choose from, depending on their needs. She commented that story telling is a key component to the tool as well, with examples and prompts integrated into the tool. They showcased the Indicator Card Sorting Activity, which is within the Assess section of the tool; this tool helps communities discuss and curate a list of indicators, to make sure they are the most relevant to their needs.

Keely finished the presentation by highlighting that ERB is intended to help create stronger community connections and networks, help communities learn about hazards, equity and resilience, identify actions and commitments to implement actions, create visualizations, and serve as documentation for the assessment. She commented that they offer free 2-hour coaching sessions with EPA staff as well as free office hours every 2nd Wednesday and 3rd Friday of the month.

Discussion

Julie commented that this is great and she appreciates how it centers equity in resilience discussions.

Vamsi Sridharan asked how they translate the information about building stakeholder networks within the tool. He was wondering how they take the information collected in the tool and transform it into a network of engagement with stakeholders. He was also wondering if users can use this tool to understand the mental maps of the stakeholders and the various/unique issues that each group may be facing. Keely responded that there are a number of resources and activities within the community engagement section of the tool, depending on where end-users are at in their process. Example activities include identifying community groups and diagramming connections and identification to barriers that prevent participation and strategies to address the barriers. She added that a lot of what the tool provides are resources and templates to help with the finer details of the process. The tools can assist with strategically carrying-out engagement. Marissa also commented that the community engagement and network mapping really focuses on flows of information and resources and not as much mental models.

Vamsi asked a follow-up question about if they offer any sort of training program beyond what they have on their website; Keely responded that they have the coaching program, which is essentially a training program. She added that they are working on asynchronous training videos. They have also done trainings for groups that have requested and added that if folks can reach out to her if they are interested in trainings for their organization/agency. Marissa also provided the emails and points of contact for the coaching sessions and general tool questions: Emily Eisenhauer (eisenhauer.emily@epa.gov) and Raven Nee (nee.raven@epa.gov).

Joe Galarraga commented that he thinks this tool will be portable and adaptable for a lot of different communities and thinks it is a great product. He was wondering if the team has heard any feedback on the tool since it was launched and he was wondering how they plan on disseminating information about the tool to different end-users. Keely responded that since the tool is so new, they have not had groups go through the full ERB process yet, but has received positive feedback from the groups who served as pilots for the product. She thinks that groups are using the tool in more of a “pick and choose” manner where they select the activities that are pertinent to where they are in the process and their needs. As far as outreach, they have been presenting this tool at various working groups, forums, and conferences. They are also developing an evaluation plan to help understand how folks are using the tool.

Julie asked about the Indicator Card Activity, specifically wondering if there are any GIS maps/layers used in this process for indicators that are more spatially explicit (e.g., Tree Canopy Indicator). Marissa responded that they wanted to complement the tools that are already out there, so with indicators that have associated mapping layers include links to where end-users can find that data. She also commented that they have a participatory mapping activity in one of their sections.

Keely thanked the workgroup for having them to present and commented that the tool also has a public [GitHub](#) repo for both Mac and PC.

2:20 PM [**Prototyping Decision Support and Monitoring Tools for Equitable Management of Salt Contamination of Water Supplies in Tidal Rivers**](#) [Raymond Najjar, Penn State University & Kanika Kumar, University of Pennsylvania] (25 Minutes)
Raymond will present on the ongoing NSF-funded effort to develop tools to help monitor and manage decision-making to address salt water intrusion of water supplies in tidal rivers.

Summary

Ray presented on their current NSF-funded project, which seeks to develop decision and monitoring tools to address salt water intrusion. The motivation behind the project stems from the fact that tidal waters are withdrawn for a number of uses including power plant cooling, irrigation, industrial and manufacturing applications, and human consumption. With climate change, the salinity of coastal waters is increasing, and these uses and intakes in the Chesapeake Bay and other estuaries are threatened by these changes. Decision support tools are needed to manage this threat. This research focuses on developing a new coupled watershed-estuary model that simulates the transport and fate of major salt ions and to use the model and artificial intelligence algorithms to create a planning tool, which will identify management strategies. To understand tidal water use in the Chesapeake Bay, the project team identified and mapped the current known intakes in the Bay (391 sites in total) and categorized them based on use. Irrigation accounted for ~50% of the intakes in the Bay, however, nuclear power and fossil power accounted for ~66% and ~28% of the volume of water withdrawn, respectively. Most of the intakes are found in tidal fresh water and mesohaline waters.

Currently, the first phase of the project is funded to develop a low-fidelity prototype of the tool; the project team will be submitting a proposal for phase two within the next month, which will provide funding to fully develop the product.

Kanika provided an overview of the decision support tool, SaltCast, which is currently in prototype form. The website provides information about salinity management to a wide range of end-users with different levels of background, scientific knowledge; one of the project team's main priorities was to ensure the product is approachable to different levels of users. Data can be visualized in a number of different formats to achieve this. Kanika explained that the tool has different levels of account types for end-users and for this presentation, demonstrated the features included in the basic package. Users can create a site specific dashboard with both short-term forecasting and long-term projections of salinity, including the major ions, for the sites selected. Users can also adjust thresholds denoting high/low salinity concentrations. Sites can be selected by pinning locations on a map and selecting their depth. Kanika ended the tool review by asking for feedback and thoughts from the workgroup.

Discussion

Michael Craghan commented in the chat that the EPA funded a [study](#) a while back that looked at the effects of climate change on salt migration in the Delaware River; he shared it in case it was useful for the project team.

Vamsi asked if they could talk a little bit more about the watershed model that they are using. Ray responded that the modeling work is being done by one of the co-PIs, Ming Lee, at UMCES. For the Ocean model, they are using a finite volume community ocean model (FVCON); the model uses an unstructured grid which works well in tidal fresh waters, which are dendritic. The model allows for better resolution in these tidal rivers. For the watershed model, they are using a model developed by Alfonso Mejia, at Penn State, which has separate models for the Susquehanna River Basin and the Potomac River Basin. In phase two, they will expand the watershed model to include the whole Chesapeake, with potential to include the Delaware and Hudson River basins. He added that he thinks the watershed is a SWAT-based model. He plans on adding models for the individual ions as well. Vamsi commented that this is interesting work and has faced similar issues with agricultural runoff in work that he has done in other parts of the country (e.g., San Francisco). He added that he is curious if this model would be transferrable to other parts of the country. Ray commented that he hopes that the end result of this tool would be modular enough to work in other localities.

Vamsi also commented that he was wondering if the tool they are development has any mechanism in place to provide mixed-management solutions for salt water management, such as providing users guidance on where to withdraw water based on certain thresholds. This could create a water withdrawal management plan. Allison Lassiter, co-PI at University of Pennsylvania, responded that they are designing the tool with extensive stakeholder input to ensure utility. The information gathered during the outreach is directly informing the features of the tool itself. In the custom version of the tool, they work with the end user to think about different management solutions that would work for them. She added that another research on the team specializes in

decision-making under deep uncertainty, which is helpful for thinking about management strategies for salinity projections. Kanika also commented that in the premium version of the tool, they provide state-wide data on the intake sites to understand where sites are worse off compared to others.

Lew commented that infrastructure has planning horizons, with public water supply having one of the longest planning horizons. He commented that preventing surprises, such as salinity increases around an intake site, is important for preparing infrastructure to deal with these changes. He commented that the team may want to consider sensitivity scenarios around public water supplies. He commented that there is a nexus with climate change, with potential scenarios such as increasing salinity due to summertime heat and sea level rise, coupled with higher water demands due to the same summertime heat. He commented that it is important to conduct these sorts of sensitivity analyses to provide alerts to public works employees who might not be used to thinking about these problems. Allison responded that in phase 2, if funded, they will partner with Havre de Grace, MD on similar sensitivity scenario planning. Ray commented that they are looking for partners and support from state and federal agencies and entities for the phase 2 proposal. He added that he would love to hear from folks who would be willing to draft letters of support.

Michael Craghan commented that he was curious how useful this tool would be outside of the Chesapeake Bay watershed. Ray responded that he thinks that these tools and models are fairly general, but it does require expertise to set up the model. He added that the mapping of the intakes was also more effort than expected since there is no federal database for that information. Allison also commented that they are interested in sharing or expanding this work into other regions outside of the Bay, with interest in scaling the model nationally so that there is one cohesive model for salinity changes in the coastal regions. This type of information could help with understanding the impacts of salinity changes on a national level.

Julie commented in the chat that her thoughts on salinity forecasting is that it could be used to inform salinity changes in habitats and what type of marsh may be feasible when migrating from sea level rise and habitat suitability for different fisheries (e.g., oysters do better in saltier waters). She is also curious on how precipitation change is integrated in the model/salinity forecasting. Ray responded that he is interested in the ecological implications and can also talk about the climate projections for precipitation, sea level rise, and temperature.

Nicole Carlozo commented in the chat that pairing this tool with tidal flooding forecasts could be really interesting for agricultural decision-making. Ray commented his thanks for the idea. He added that flooding was one direction they were considering. There are flood forecasts well into the future but they do not include salinity, which they thought they could add. They have not been able to find users for this sort of thing. They were thinking corrosion would be a good angle. They also thought about agriculture but have had a hard time identifying stakeholders. He asked if she had any thoughts, he would love to hear them. He also commented that he enjoyed the presentation she gave later in this meeting and thinks that there is an intersection to their work, certainly around marshes and salinity. He wonders if that is being considered by their group. He

also would be interested in any forecasts that might be available for the wetlands in the Bay as a whole.

In the chat, Sharon Hockenberry and the CBP STAR team made notes to follow up with Ray about letters of support for the project. Breck Sullivan also commented with her email (bsullivan@chesapeakebay.net) so that they can follow up offline. Ray commented to reach out to him at his email (rgn1@psu.edu) with any follow up questions or comments.

2:45 PM [GIT-Funded Marsh Adaptation Project Update](#) [Nicole Carlozo, MD DNR] (25 Minutes)

Nicole will provide an update on the near-complete GIT-Funded Marsh Adaptation Project. The project, which brought together regional partners in two focus areas (Middle Peninsula, VA & Wicomico River Region, MD) to discuss opportunities around targeting large-scale marsh adaptation projects. The project team is currently finalizing the report.

Summary

Nicole provided an update on the GIT-Funded Collaborative Tidal Marsh Adaptation Project, which is an effort that the workgroup has been supporting for the past two years. The project is currently wrapping up with the final report in near-complete form. The purpose of the project was to build partnerships and bring together the best available data and science to identify large-scale tidal marsh adaptation projects, which can also help make progress toward the Climate Resiliency Adaptation Outcome in the Chesapeake Bay Watershed Agreement.

Nicole then reviewed the goals, background, methods, and findings from the project. She started by providing the working definition of marsh adaptation that was used in this effort, which states that marsh adaptation means “incorporating climate change information and resilience strategies when planning, designing, implementing, and managing marsh restoration and conservation projects to enhance the longevity of marsh area and health.” This project sought to support a number of goals and outcomes in the Chesapeake Bay Watershed Agreement (i.e., climate resiliency, stewardship, habitat, and wetlands) through increasing capacity through partnership building. In addition to capacity-building, the effort focused on identifying research opportunities that could support management of wetlands as sea levels rise and can tap into federal funding, especially through the Bipartisan Infrastructure Law and Inflation Reduction Act. Nicole then reviewed the different marsh adaptation scenarios that were identified by the project team, which can help guide the different types of adaptation projects within the Chesapeake Bay region. Protection scenarios use data to identify healthy marshes that are susceptible to sea level rise and have potential to migrate, while restoration scenarios use data to identify degraded marshes that are susceptible to sea level rise and have the potential to migrate.

Utilizing a mapping approach, the project team developed two tiers of mapping data to identify regional focus areas that have the potential for large-scale marsh adaptation projects and to understand regional priorities within those areas. Tier one focused on metric mapping (climate vulnerability, ecological, and social vulnerability) and partner alignment mapping to understand

the efforts currently underway in the region and to identify focus areas. Seven regional focus areas were initially identified, and the Steering Committee ultimately selected the Middle Peninsula, VA and Wicomico and Deal Island, MD focus areas for the workshop effort. Tier two focused on identifying specific project opportunities with region-specific data in those two focus areas. Using the mapping tool, the project team also developed worksheets for the two focus areas, which demonstrate how to use the data to identify different protection, restoration, and enhancement opportunities, as well as tie in region-specific data, and provide examples on how to use the data to assess other priorities (e.g., ecosystem services and living resources). Nicole added that while this project focused on two areas, the other identified focus areas do remain a priority for further partnership building and project identification. She commented that there's an opportunity for the workgroup to consider how best to pursue marsh adaptation in the remaining focus areas.

The team hosted a virtual workshop in January 2024, which brought together 75+ stakeholders working in the two focus areas. The workshop focused on addressing challenges and recognizing opportunities to advance tidal marsh projects in these areas. Topics covered in the workshop included tools and technologies, management of marsh transition, incentivizing marsh adaptation actions, addressing long and short-term planning tracks, and coordinating and collaborating across stakeholders to implement larger-scale projects. Breakout discussions were held for each focus area (Middle Peninsula, VA and Wicomico and Deal Island, MD); highlights from the discussions were grouped into three main categories (i.e., decision-making needs, procedural and regulatory needs, and outreach and communication needs). For the Middle Peninsula, folks discussed decision-making around different types of restoration goals, trade-offs with marsh adaptation efforts, limitations in funding and regulatory frameworks, and strategies to address obstacles with permitting for beneficial use of dredge material. For the Wicomico and Deal Island focus area, folks discussed beneficial use of dredge materials for thin layer placement (e.g., alignment of funding, permitting and sediment supply), understanding how best to site these thin layer projects, and considering unintended consequences for marginalized communities. Nicole highlighted that the original intent of this project was to develop a list of potential project opportunities, which did not quite happen during the workshop. The Middle Peninsula folks already had project locations in mind before the workshop, which helped focus their discussions, but for the Wicomico focus area, most of the discussions focused on challenges and there is more work needed to be done to get to the point of targeting projects. Nicole then discussed the shared learning takeaways from the workshop, which focus on coordinating project pipelines, challenges and opportunities with planning and permitting coordination, and working with communities.

Next steps for the project include finalizing the report and development of communication products (September 2024), working with the CBP's GIS team to incorporate the mapper in the CBP Targeting Tools Portal (August 2024 – October 2024), planning a marsh adaptation meeting with Envision the Choptank partners (October 2024), and seeking funding to support additional marsh adaptation efforts (2024-2025).

Discussion

Kevin Du Bois commented in the chat that there is an upcoming meeting at the Virginia Institute of Marine Science to work on state guidance for beneficial use of dredge materials. Nicole responded that her team is unable to attend but she thinks that it is a Coastal Zone Management funded effort. She added that they are working internally at Maryland to pursue shallow water dredging assessment. Kevin also commented that he would be interested in getting the final report.

3:10 PM **Feedback from July Management Board Meeting- Adaptation Outcome Progress Presentation [Julie Reichert-Nguyen] (15 Minutes)**

Julie will provide a briefing on the discussions and feedback received on the CRWG's Adaptation Outcome Progress Presentation at the July Management Board Meeting.

Summary

Julie presented on the Management Board's (MB) feedback on the Adaptation Outcome's progress presentation at the July MB Meeting. She highlighted that the Climate Resiliency Workgroup is a science support group, situated within the Scientific, Technical Assessment, and Reporting (STAR) team, and are charged with two outcomes to support the Climate Resiliency Goal in the Chesapeake Bay Watershed Agreement. The presentation given to the MB in July focused on updates on the Adaptation Outcome, as this outlook for this outcome is currently categorized as "Uncertain." Challenges towards making progress include lack of quantitative goals, no mechanism for project tracking, and unknown project success for enhancing Bay and ecosystem resilience. While the outlook is uncertain, recent progress is increasing due to efforts focused on marsh adaptation, nature-based solutions, and community resilience. Two requests were made to the MB at the July meeting. The first request asked for feedback on climate adaptation progress structural and resource needs; feedback focused on ensuring alignment with the Beyond 2025 effort, assessing where the CRWG can add most value, and current outcome language does not address watershed and climate change policy. The second request asked for feedback on the potential CRWG development of quantitative climate outcomes; feedback focused on the need for SMART outcome language to measure success and was generally supportive of the workgroup pursuing new outcome language.

Discussion

Mark Bennett commented that he was cautious about pursuing new outcome language at the moment, as he would like to hear more about the Principal's Staff Committee's response to the Beyond 2025 effort. He is concerned about investing time and effort if leadership decides that there is no opportunity to change the language. Julie responded that there has been talk about the potential to refresh outcome language in Phase 2 of the beyond 2025 effort. Julie commented that it is also a discussion that should be conducted during the next Strategy Review System cycle which is upcoming in 2025. Kevin Du Bois commented in the chat that SMART goals are a worthy endeavor.

3:25 PM **Opportunities, Partner Announcements and Wrap-up [5 Minutes]**

3:30 PM Adjourn

The next workgroup meeting is being planned for November 21st, 2024, as a special working meeting with Envision the Choptank and focused Marsh Adaptation is tentatively planned for October.

Participants

First Name	Last Name	Affiliation
Allison	Lassiter	University of Pennsylvania
Amy	Freitag	NCCOS
Arianna	Johns	VA DEQ
Ashley	Kelly	DoD
August	Goldfischer	CRC
Breck	Sullivan	USGS
Bruce	Vogt	NCBO
Cassie	Davis,	NYS DEC
Chris	Guy	USFWS
Chris	Feinman	EPA ORISE
Debbie	Herr Cornwell	MDP
Elizabeth	Andrews	UVA
Emma	Corbitt,	HRPDC
Gabriel	Duran	CRC
Jamileh	Soueidan	CRC
Jim	George	MDE
Joe	Galarraga	TNC
Josef	Rieger	Elizabeth River Project
Julie	Reichert-Nguyen	NCBO
Kanika	Kumar	University of Pennsylvania
Karen	Kesler	EPA
Keely	Maxwell	EPA ORD
Kevin	Du Bois	DoD
Kevin	Schabow	NCBO
Lew	Linker	USGS
Marissa	Matsler,	EPA ORD
Mark	Bennett	USGS
Matt	Konfirst	EPA
Matt	Docalovich	UVA
Maureen	Shacklette	EPA ORD
Michael	Craghan	EPA
Nicole	Carlozo	MDNR
Ray	Najjar,	Penn State
Rick	Mittler	Alliance for the Chesapeake Bay

Sharon	Hockenberry	Integrity Data Solutions
Sophie	Waterman	USGS
Taryn	Sudol	MD Sea Grant
Taylor	Woods	USGS
Vamsi	Sridharan	Tetra Tech

What are the biggest challenges with respect to equity and resilience in your part of the Bay watershed?

