COLORADO NUTRIENT MANAGEMENT WORKSHOP

AUGUST 2018

SYNTHESIS REPORT

Prepared by the One Water Solutions Institute

Connecting world class research with real-world water challenges

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EXECUTIVE SUMMARY

PURPOSE

The goal of the workshop was to discuss the CLEAN Center's role in helping Colorado communities make progress towards nutrient targets. Desired outcomes of the meeting were to identify:

- Water quality data and information that should be managed by the CLEAN Center and provided to stakeholders across the state
- Analysis that should be conducted to help the state and Colorado stakeholders evaluate the effects of management actions including technologies, policies and regulations
- Effective mechanisms for communication of Center activities with Colorado stakeholders
- Broader audiences that should be engaged by the CLEAN Center

DESCRIPTION & ATTENDEES

The Center for Comprehensive, Optimal and Effective Abatement of Nutrients (CLEAN) was created to generate knowledge, build capacity, forge collaboration and demonstrate sustainable solutions for reduction of nutrient pollution in our nation's water resources. The Colorado Nutrient Management Workshop was held at Colorado State University on August 9, 2018. Approximately 40 representatives from the stormwater, wastewater, agriculture, research, regulation and permitting sectors attended the meeting. The meeting was conducted to help the group identify next steps for the CLEAN Center and a clear path for communicating the success and activities of the Center.

The workshop utilized small breakout groups, organized by sector, to facilitate rich conversation around the focus areas of the meeting. The day started with a brief introduction of the intended purpose of the workshop followed by an update on the prevailing approaches to water quality control in Colorado. The research team provided a brief review of the data and analysis tools developed by the CLEAN Center to enhance water quality control in the State. This session was followed by a breakout activity with guided small group discussion on potential tools, data and analyses that could assist stakeholders in different sectors improve the management of their systems. A follow-up discussion was then led on effective mechanisms to visualize outputs of these products and communicate them effectively to a variety of users. The day concluded with a discussion on approaches for engaging and communicating with the broader community.

SUMMARY OF KEY FINDINGS

The Center has generated valuable data and analysis tools but the communication and access to this information could be disseminated in a more coherent and credible manner. The assumptions of the tools and models lack transparency and the user-friendliness of the products could be improved. However, there is great potential for the CLEAN Center to continue its success by developing mechanisms to communicate more effectively and leverage support from its members to promote the Centers activities and products.

WORKSHOP

SMALL GROUP BREAKOUT SESSIONS

Following the opening discussions, workshop participants were asked to self-divide into groups containing members of their sector to discuss the potential products and mechanisms that would help outline how the Center could assist stakeholders improve the management of their water systems and determine effective mechanisms to visualize outputs and communicate the Center's activities to a variety of audiences.

Groups were provided a list of focus questions for each of three breakout sessions. Participants were given a short amount of time to gather their thoughts individually and were then asked to share their ideas with their sector group. After 30-minutes each group was asked to identify a spokesperson to report their findings to the full group. Responses were tabulated on sticky notes and organized into the following categories:

- Session 1: Priority Analysis and Questions
  - What types of questions are you interested in answering or exploring?
  - What types of analyses would be needed to answer these questions or to help improve the management of your sector?
- Session 2: Priority Data, Modeling and/or Analysis Tools
  - What analysis, modeling or software tools would be most beneficial to your sector?
  - Which tools should be prioritized by the Center?
  - Describe how you would like to see the outputs of these tools visualized?
  - What is the most effective method for training personnel on use of the tools?
- Session 3: Communication Strategies and Next Steps
  - With whom should we be communicating? What audiences may we be missing?
  - What are effective mechanisms for communicating the Center's activities?
  - In what ways might you contribute to Center activities?

EMERGING THEMES

The small-group discussions resulted in a range of ideas that were then reported-out by each of the small-groups and discussed by the group as a whole. The suggestions resulting from this conversation fell into several cross-cutting themes and were either **communication-focused** or **product-focused**.

Communication

Accessing & Organizing Information

While the Center has generated ample high-quality information including data, models and analytical capacities, communication of and access to this information was identified by all sectors as an area for improvement.   Workshop participants encouraged the Center to organize the information in a more cohesive manner by avoiding jargon and presenting the material in a more credible fashion. The Center's products should be easily accessible in a user-friendly platform. One suggested strategy for increasing the visibility of the Center's products while also establishing credibility was to have Colorado Department of Public Health and the Environment (CDPHE) make the tools available on their website.

Transparency

A remerging suggestion from meeting participants was provide greater transparency in the assumptions and limitations of the Center's models and software. Calibration processes and schedules as well as levels of uncertainty should also be made readily available to users.

Training

In order to successfully communicate the success of the Center, personnel in various sectors require training on the use of tools and products developed by CLEAN. Several suggestions were made on effective mechanisms for providing this critical service:

- On-site/in-person training, tailored to users, organizations and/or divisions
- Example or scenario-based training (e.g. different exercises to complete)
- Documentation and written tutorials including graphics, pictures and searchable text
- Videos and webinars

The agriculture group emphasized the need for training to come from a trusted source, such as another producer or known association. Similarly, other groups suggested peer-to-peer training or mentoring at the organizational level would provide credibility and generate enthusiasm for the use of the tools. Social media outlets were also identified as an effective mechanism to disseminate information on training events and materials.

Contact Information

In addition to training users, the group identified the need for a primary point of contact to answers questions, address challenges or issues in using the tools, provide service quotes and general assistance. The group suggested setting up a Help Desk and toll-free phone number to address these concerns.

Visualizing Information

Stakeholder needs are highly varied and as such, visualization of results and outputs vary according to user and intended purpose. The wastewater group suggested an effective strategy to introduce a tool or model may be to begin with the results or outputs, effectively demonstrating the visual component and then walking a user group through the process of generating that document or report.

User Interface

Workshop participants encouraged the Center to keep the tool interface simple and graphical, perhaps recreating interfaces one may be familiar with (e.g. Google Maps). The interface should consist primarily of maps or tables with limited text. Links should be provided for access to more detailed information. As mentioned, transparency should be incorporated into the interface to the extent possible.

Reports

Documents generated through the tools and models should be highly visual, containing maps, tables, histograms and other meaningful summary graphics. Reports should be customizable, allowing the user to select preferences that best suit their needs. Reports, figures and data should be downloadable and electronic copies should be accessible. The agriculture group also suggested developing a report or document that could be provided to a utility or regulatory entity to satisfy some type(s) of permitting requirements (e.g. NRCS/WISE).

Infographics

Several groups identified a need for meaningful, yet simple infographics. These materials are assuredly an effective strategy for communicating complex information in a simplified manner. Infographics are often highly customized for the intended audience which may be limitation in the Center's capacity. Further discussion on potential solutions to this challenge may be warranted.

Engagement

A comprehensive list was generated by the full group to identify various audiences the Center should be engaging (Appendix A). The list ranges from consultants, land-use planners and policy makers to producers, residents, community leaders and students. Water quality forums, alliances and organizations as well as watershed groups and conservation districts should be informed of the Center's activities and products.

Presentations and demonstrations should be conducted at local, regional and national conferences and meetings.

A strong argument was made for engaging libraries to not only reach broader audiences, but potentially those who may not have access to web materials (e.g. rural areas with limited internet access). Additionally, partnering with libraries and potentially school districts may

result in curriculum inclusion of CLEAN products. Educating today's youth will also be an effective method to continue the future success and sustainability of the Center.

Social media, YouTube videos and webinars were also suggested for engaging various communities we may not be able to reach personally.

Products

Analysis

Analytical needs discussed by the group varied by sector. A complete list of potential analyses is listed in Appendix A. A few cross-cutting topics are described below.

Cost Benefit Analysis

The need for economic analysis was identified by several sectors. The Center is encouraged to engage the expertise of an economist to incorporate this dimension into existing analytics as well as the development of new models and tools. The cost-benefit analysis should include economic unit costs and demonstrate the economic benefits of specific practices in various sectors.

Fate and Transport

Several sectors identified the need to capture fate and transport of contaminants in both analytics and modeling.

Seasonality

The need to measure impacts to receiving water bodies by season was recognized by the wastewater group.

Nutrient Loading & Trading

Analytical capacities are needed to assess, evaluate and identify nutrient trading options. A few examples of potential analyses include:

- Identify relevant contributors to nutrient loading
    - Determine loads by sector and watershed
- Cross-sector trade ratio management
    - N:P ratio impacts
- Mass balances on nutrient loading
- Identify and define successful locations for trading

Several questions arose throughout the workshop regarding nutrient trading. A complete list can be found in Appendix A. A few examples are provided below:

- How do we manage trade ratios across sectors and watersheds or river basins?
- Who should a utility contact to discuss trading options?
- Who is responsible for ensuring the maintenance of nutrient trading?

- What are the pros and cons of nutrient trading? Are there other examples to explore?
- Nutrient credit definition and calculation are needed for transparency

Evaluation

Decision making and evaluation analysis could also be of use to multiple sectors. Some suggestions include:

- Effectiveness of non-structural BMPs
- Efficacy of Regulation 85
- Efficacy of the VIP
- Evaluation of implemented projects

Tools & Software

A complete list of recommendations can be found in Appendix A. Two primary topics emerged from the group discussion and are detailed below.

BMP Decision Tools

Several groups identified needs to measure efficacy, prioritize and project impacts of Best Management Practices (BMPs). Examples include:

- Prioritization tools
  - o BMP selection
  - o Site selection
- Tools to identify economic benefits of BMPs (e.g. which practice provides the most benefit for the investment)
- Tools to evaluate projected BMP impacts at the watershed scale
- Tools to evaluate effects of retrofit activities
- Tools to evaluate BMP amplification impacts

Field Measurement Tools

The agricultural group emphasized the need for an effective field measurement tool to increase field management success. This tool should capture the variables in practices as well as use on-farm data for calibration in order to corroborate models/tools based on data from working farms.

The need was also stressed to work directly with producers to identify the tools that would be most beneficial to them, particularly for nutrient trading.

Data

Suggestions were made not only on the types of data that would be helpful, but also regarding access to these data. As discussed in the Communication section, the need to easily download data or upload your own information was identified. Though these capacities are currently available in the software and tools provided by the One Water Solutions Institute, the Center should explore additional mechanisms to communicate this information.

Nutrient Baseline

Several groups identified the need to generate and access baseline data for nutrient loading, preferably by sector. These data would provide a better understanding of current practices and may also account for or better capture "legacy nutrient contributions", particularly by the agricultural sector. Regulators would also like to identify a methodology that could be used to develop a nutrient baseline data set.

CDPHE Roadmap Parameters

New data should be added in the future to encompass and align with the CDPHE Roadmap parameters including ammonia, selenium and other pertinent nutrients.

Project Database

The stormwater group suggested the creation of a multi-jurisdictional database of current and ongoing projects would create transparency both between geographic locations as well as with the general public. The addition of such information may also generate new collaborations and disseminate information on tools currently available through the Center.

Streamline Processes

A need for streamlined procedures to collect, submit and summarize data was identified by the CDPHE group.

CONCLUSION

The CLEAN Center, in collaboration with its partners, will work to address suggestions identified during the Workshop. Emphasis will be placed on communication of existing activities and products available through the Center via the One Water Solutions Institute (OWSI).

Training sessions are planned to ensure the data analysis and modeling tools are accessible by various state-wide stakeholders. The sessions will be organized via videoconference and in-person meetings to facilitate address questions and provide hands-on training. Recordings of videoconference sessions will be made available.

A new OWSI website is planned for Fall 2018 which should address several concerns regarding access and organization of information. In addition to the revised website, the Center's current technology platform (eRAMS) will be receiving an update which should address some of the user interface and experience suggestions raised by the working group. Additional information will be provided on the plans for unveiling the new web interface.

APPENDIX A

Communication

Accessing & Organizing Information

Wastewater

- Can we access information about what has been adopted by WWTPs across Colorado?
- Knowledge of WWTF treatment type with effluent water quality
- Downloadable data and reports
- What are the charges for OWSI to support projects/conduct analysis?
- How to we link model outputs with decision-making?

Stormwater

- Utilize social media for training and tools

Agriculture

- Need to develop non-web-based mechanisms to communicate info (e.g. workshops)

CDPHE

- Easily downloaded into CSV

Tools/Software

Wastewater

- How can we organize tools and make them readily available (e.g. CDPHE)?

Stormwater

- How to build awareness of existing tools and how/when to use them (workflows)?
- Pilot studies in target watershed combined with community-based social marketing techniques

Training

Wastewater

- Tools need to be beta tested by all sectors (consultants, utilities, regulators)
- User stories videos

Stormwater

- Guidelines for monitoring to be prepared for future regulations
- Graphic-based tutorial

- Utilize social media for training and tools
- Hands-on training and workshops (3-15 participants)
- Combination of videos, exercises/courses to take on own time

Agriculture

- Training conducted by a "trusted" source – other producers or known associations

CDPHE

- On-site training for organization level buy-in, follow-up online training
- One-on-one; at Division tailored for Division
- One-on-one for Water Quality Forum Meeting or WWVC
- Written tutorials with pictures and searchable text

Transparency

Wastewater

- Expected frequency of re-calibrating models (SWAT)
- Transparency of analysis/tools/models
- Reflect level of uncertainty

Stormwater

- Document tool assumptions and limitations

Agriculture

- Transparency (model assumptions of Ag)

Contact Information

Wastewater

- Who should a utility contact for trading? Broker?
- Who can manage trading between sectors and in different river basins?

Agriculture

- Help desk and contact info for OWSI – email, 800#, videos, FAQ

Visualizing Information

Wastewater

- Example reports – start here, show these first then how to generate and use tool
- Custom reports – user selected outputs
- Reports should be downloadable

Stormwater

- Infographics

- o   Simple - public education and outreach campaigns
- o   Complex information
- Visual real-home simulations of stream conditions
- User Interface
  - o   Visual interface for feasibility of BMP placement
  - o   Simple graphical user interface

Agriculture

- Infographics – tailored to Ag
- Report showing what is the value in $ of Ag BMP for point source
- Document that utility or Ag could show the regulators (e.g. WISE & NRCS)
- User Interface
  - o   User-friendly
  - o   Simple
  - o   Maps and tables – very little text with links to more detailed information

CDPHE

- Easily downloaded into CSV
- Baseline models and times series graphs, spatial
- Maps – google maps (familiar interface for users)

Audience

Wastewater

- Consultants
- Community leaders (mayor, city council)
- CDPHE (credibility)
- Sustainability boards, other boards

Stormwater

- Land-use planners
- Policy makers
- Residents
- Watershed groups
- Lake associations
- Colorado Stormwater Council
- State-wide water quality groups

Agriculture

- Irrigation districts
- Ag organizations

- Co-ops
- Colorado Ag Water Alliance
- Producers
- Youth (to train the future_
- CSU Extension
- NRCS programs

CDPHE

- Water Congress
- WWVC
- 2018 Planning agencies
- Conservation community
- Conservation districts
- Watershed groups
- Control and regulatory groups
- Water quality forum

Mechanisms

Wastewater

- Example reports – start here, show these first then how to generate and use tool
- Custom reports – user selected outputs
- User stories videos

Stormwater

- Legitimate and effective marketing tools
- Case studies to apply tools for training
- Experience-based learning
- Data-supported most effective actions
- Calculate personal water quality impact
- Utilize libraries to distribute information

Agriculture

- Partner with education or school groups
- Work into state curriculum
- Blur the lines on audience – create opportunities for multiple sectors to engage collectively
  - Producers learning from other sectors, attend other sector meetings, tours
- Tailor user experience – "I am a student/producer/farmer/…"

CDPHE
- Peer-to-peer presentations and mentoring
- Presentations of tool at meetings and conferences
- Webinars
- Present at Sustaining Watersheds Conference
- Newsletters
- Targeted marketing – inform key players
  - Water quantity groups (e.g. LARV)

Products

Analyses

Cost-Benefit Analysis
- Cost-benefit analysis (engagement of economist) – Wastewater
- Include economic unit costs - Wastewater
- Any tool must show economic benefit to the farmer – Agriculture

Wastewater
- How do we deal with new sources of phosphorus (addition to municipal water)?
- Who are the relevant contributors to nutrient loading?
- How do we manage trade ratios across sectors?
- Population and climate
- Mass balances on nutrient loading
- Monitoring use of lower cost surrogates
- Models to identify N:P ratio impacts
- Cost-benefit analysis (engagement of economist)
- Receiving water body impacts based on seasonality
- Reflect uncertainty
- Capture fate and transport, and access seasonal differences (receiving water body impacts)

Stormwater
- How to select analysis sites for a representative picture of the watershed?
- What is the most effective scale for stormwater analysis (BMPS, trib systems, MS4)?
- Measure effectiveness of non-structural BMPs (e.g. source control)
- How to model/access ecosystem services and public valuation
- Decision tool for BMP selection and site prioritization (based on land-use)

- Pilot studies in target watershed combined with community-based social marketing techniques

Agriculture

- Ability to streamline or characterize variables in practices
- Legacy Ag nutrient contributions factored into models? (how effects of poor management systems used previously are impacting soil profiles, setting realistic expectations of how long these may linger)
- Model needs to include NPS risk by form (aka kind of fertilizer)
- Analysis of cover crop benefits on water quality

CDPHE

- Determine loads by sector by watershed
- How do we calibrate loading reduction estimates?
- How can we define successful locations for trading?
- How effective is Reg 85?
- How effective is the VIP?
- How to evaluate implementation projects?
- What methodology can we use to develop a nutrient baseline?

Data

Wastewater

- Population
- Climate

Stormwater

- Multi-jurisdictional database for ongoing projects (public involvement)

Agriculture

- Need baseline data for Ag – understand actual practices
- On farm data for BMPs vs model, On-site calibration/corroboration of models (practice on "real farms")

CDPHE

- How can we streamline the data submission and acquisition process?
- What methodology can we use to develop a nutrient baseline?
- Alignment/inclusion of CDPHE Roadmap parameters – ammonia, selenium, nutrients, ect.
- Easily downloaded into CSV

Tools

Stormwater

- Prioritize areas for improvement
- Modeling projected BMP impacts
- Modeling retrofit activities on a watershed scale
- Decision tool for BMP selection and site prioritization (based on land-use)

Agriculture

- Effective field measurement tool for field management
- Ability to streamline or characterize variables in practices
- Decision tool to help determine which BMP provides the best buck for the benefit
- Decision-making tools/models to prioritize or determine best BMP for a specific area (see NRCS)

CDPHE

- Map-based tools
- Fate and transport
- Alignment/inclusion of CDPHE Roadmap parameters – ammonia, selenium, nutrients, etc.

Other Themes

Nutrient Trading

Wastewater

- How can we ensure maintenance occurs within nutrient trading – who is responsible?
- How do we manage trade ratios across sectors?
- Who should a utility contact for trading? Broker?
- Who can manage trading between sectors and in different river basins?

Agriculture

- Is a trading system the best way to deal with nutrients (pros/cons)?
- Nutrient credit definition and calculation
- Ask producers what tool they need for trading
- Are there systems/examples of water quantity utility-framer relationships that better than trading system? Maybe use existing contract mechanisms. Keep the process simple for agricultural practitioners.

CDPHE

- How can we define successful locations for trading?

Best Management Practices

Wastewater

- What are the surface water benefits associated with practices?

Stormwater

- Decision tool for BMP selection and site prioritization (based on land-use)
- Prioritize areas for improvement
- Modeling projected BMP impacts
- Modeling retrofit activities on a watershed scale
- Visual interface for feasibility of BMP placement

Agriculture

- Area-specific BMP research (study what real farms actually use)
- On farm data for BMPs vs model, On-site calibration/corroboration of models (practice on "real farms")
- Extreme events compensation of Ag for BMPs
- What level of BMP amplification is needed to <u>maintain</u> water quality as water <u>quantity </u>decreases
- Decision tool to help determine which BMP provides the best buck for the benefit
- Decision-making tools/models to prioritize or determine best BMP for a specific area (see NRCS)