

# London Workshop Sept. 11-13, 2024 Synthesis Snowball Brainstorming Outputs Ideas and Activities

- ⇒ Note: Below is the full detailed synthesis of the Sept. 12<sup>th</sup> & 13<sup>th</sup> Snowball Brainstorming Sessions; the notes from each Snowball Brainstorming Sessions are appendices to this document.
- ⇒ Note: For 'Water Resource Management', water resource collectively refers to water supply, stormwater, and/or wastewater (i.e. depending on specific context of idea/activity) as well as decentralized/centralized management approaches for all
- $\Rightarrow$  water supply=surface/subsurface reservoirs; wastewater=storm/rainwater, grey water (can be storm as well as wash water), black water (sewage)
- ⇒ Big Research Ideas Related to Water Resource Management:
  - Need systematic approaches for
    - o information and baseline data collection [need framework(s) & toolkit(s)]
    - o benchmarking/comparative analyses/intercomparisons [current/future; need toolkits]
    - o performance assessments/monitoring in support of adaptive management [need toolkits]
  - Framing adaptation challenges in monetary terms
  - Uncovering transformative pathways
  - Integrated/holistic systems approaches
  - Circular economy: water's valuation, water reuse and urban and regional planning
  - Public engagement and behavior change

Focused Research Activities for Water Resource Management (with multiple projects w/in)

- 1. baseline information and data collection (current status)
- 2. benchmarking/comparative analyses/intercomparisons (current & future)
- 3. toolkit development for adaptive management approaches and initiatives
- 4. engagement

- 5. circular economy
- 6. across themes-systems approaches
- 7. technical approaches and needs

\* need 'toolkits' for pretty much everything, i.e. need standardization for all cities

| 1. Baseline Information & Data Collection Needed for All Cities (current status)   |    |
|--|----|
| *need to review comprehensive frameworks like CROCUS to ensure capturing all critical 'sub bins'                           |    |
| A. Governance & Regulation for Water Resource Management   |    |
| Drivers  |    |
| Constraints  |    |
| <ul> <li>Multi-organizational integration for water resource management (i.e. IWRM)</li> </ul>                             |    |
| Risk and crisis management (i.e. flooding and scarcity)  |    |
| B. Water Resource Finance & Budgeting  |    |
| <ul> <li>what laws and regulations drive local government (and overlapping jurisdictional</li> </ul>                       |    |
| entity/entities) and hence capital investments?  |    |
| <ul> <li>What is the local government (and overlapping jurisdictional entity/entities) capital budgetir process</li> </ul> | ıg |
| • other factors to be considered for capital projects, such as legal requirements, for capital                             |    |
| projects   |    |
| C. Strategic and Implementation Approaches   |    |
| Models (climate, hydrologic/hydraulic, intervention)   |    |
| Cost benefit analyses (what tools are needed?)   |    |
| <ul> <li>Necessary required non-city government partners (who is needed)</li> </ul>  |    |
| D. Public Engagement/Communication, Community Engagement, Behavioural Change   |    |
| • why  |    |
| <ul> <li>who is mandated and who is needed</li> </ul>  |    |
| <ul> <li>how (need to avoid social/territorial segregation)</li> </ul>   |    |
| when   |    |
| what   |    |
| E. Performance Assessment/Monitoring Protocols & Adaptive Management   |    |
| (bio/physical, social technical; benefits/co-benefits; environmental vs human centric)                                     |    |
| what is assessed   |    |
| <ul> <li>how assessed (quantitative vs qualitative; reproducibility)</li> </ul>  |    |
| <ul> <li>who assesses (agency members, contractors, researchers)</li> </ul>  |    |
| <ul> <li>how long assess</li> </ul>  |    |
| <ul> <li>how fund assessments (ties back to finance and budgeting with baseline requirements)</li> </ul>                   |    |
| <ul> <li>how are benefits and co-benefits assessed (ties back to finance and budgeting with baseline</li> </ul>            |    |
| requirements)  |    |
| <ul> <li>how often do cities evaluate monitor to fine tune/adjust adaptation approaches (there is a</li> </ul>             |    |
| need to revise approaches for mandated monitoring)   |    |
| *see Workplan items A, E, and CP2 with Digital Twin tool   |    |
| F. Best Practices  |    |
| • what   |    |
| • why  |    |
| G. Historic Transformations (what transcended any governance strategies? and how can this inform                           | I  |
| current/future mandates)   |    |

| <ul> <li>how: identifying and mapping the historic social/technical systems</li> </ul>  |
|---|
| • when  |
| • why   |
| 2. Benchmarking/Comparative Analyses Between Two or More Cities (current status & future)   |
| *benchmarking/comparative analyses activities <u>must</u> flow from what is developed in #1 with baseline data gathering                                  |
| *see Workplan items A. E. and CP2 with Diaital Twin tool  |
| A. Governance & Regulation  |
| Drivers   |
| Constraints   |
| <ul> <li>Multi-organizational integration for water resource management (i.e. IWRM)</li> </ul>  |
| • Risk and crisis management (i.e. flooding and scarcity)   |
| B. Management Approaches & Timelines  |
| • Grey  |
| Green/nature-based/hybrid   |
| • Reuse   |
| Operation & Maintenance   |
| C. Finance & Budgeting  |
| <ul> <li>who drives budgeting</li> </ul>  |
| <ul> <li>what drives budging</li> </ul>   |
| other factors to be considered  |
| D. Strategic and Implementation Approaches  |
| <ul> <li>Models (climate, hydrologic/hydraulic, intervention)</li> </ul>  |
| <ul> <li>Cost benefit analyses (what tools)</li> </ul>  |
| <ul> <li>non-agency partners (who)</li> </ul>   |
| E. Public Engagement/Communication, Community Engagement, and Behavioral Change   |
| • why   |
| • who   |
| <ul> <li>how (need to avoid social/territorial segregation)</li> </ul>  |
| when  |
| F. Performance Assessment/Monitoring Protocols & Adaptive Management  |
| (bio/physical, social technical; benefits/co-benefits)  |
| <ul> <li>what is assessed/monitored (bio/phys parameters, social technical parameters; benefits/co-<br/>bonefits)</li> </ul>                              |
| • how assessed/monitored (quantitative vs qualitative; reproducibility)   |
| <ul> <li>now assessed/monitored (quantitative vs quantative, reproducibility)</li> <li>who assesses (agone) members, contractors, researchers)</li> </ul> |
| <ul> <li>who assesses (agency members, contractors, researchers)</li> <li>how long assess/monitor</li> </ul>  |
| <ul> <li>how fund assessments (monitoring</li> </ul>  |
| <ul> <li>how rand assessments/monitoring</li> <li>how are benefits and co-benefits assessed</li> </ul>  |
| <ul> <li>how after do cities evaluate monitor to fine tune/adjust management approaches</li> </ul>  |
| G. Best Practices   |
| • what  |
| • why   |
| ,<br>H. Historic Transformations (what transcended any governance strategies? and how can this inform   |
| current/future mandates)  |
| <ul> <li>how: identifying and mapping the historic social/technical systems</li> </ul>  |

| • when  |
|---|
|   |
|   |
| 3. Toolkit development for systematic assessment of adaptive management approaches & initiatives            |
| *need to review comprehensive frameworks like CROCUS to ensure capturing all critical 'sub bins'            |
| *see Workplan items A, E, and CP2   |
| A. Models- i.e. climate, flooding, pollutant loading, multi-criteria  |
| B. Storm Flooding (pluvial/compound/coastal or riverine surges) including meteorological i.e. in situ       |
| measurements w/ sensors, discrete measurements  |
| C. Water Quality i.e. <i>in situ</i> measurements w/ sensors. discrete measurements                         |
| D. Soil Infiltration i.e. in situ measurements w/ sensors, discrete measurements                            |
| E Water resource management infrastructure performance i.e. grev/green/nature-based/hybrid: risk            |
| and vulnerability assessments: monitoring & evaluation frameworks: equity & inclusivity assessments:        |
| lifecycle management & assessments  |
| E Integrated water management models  |
| C Einance and Budget  |
| G. Finance and Budget   |
| H. Governance & Regulatory Structures   |
| I. Water Resource Circular Economy  |
| J. Historical Context & Water's Valuation   |
| K. Communication (all types of stakeholders) Community Engagement (equity & inclusivity assessments;        |
| social & behavioral impact assessments)   |
| 4. Engagement   |
| A. Comparison of different types of stakeholders (i.e. govt, community, ngo, private sector) visions for    |
| short and long-term change  |
| B. Social networks and enabling technologies  |
| C. Environmental justice toolkit expansion; Cultural Sensitivity & Local Context                            |
| D. Visualisation and communication of risk  |
| E. Justification of investments; Stakeholders Influence Mapping   |
| F. Successful engagement strategies   |
| G. Behaviour intervention   |
| H. Definitions of what engagement means   |
| 5. Circular economy and water resource recovery   |
| *see Workplan item CP3  |
| A. Closing entire cycle and turning what is currently a wastewater into a resource                          |
| B. Integration of water resource recovery with broader urban and regional infrastructure                    |
| C. Circular economy metrics and impact assessment for water resource recovery                               |
| D. Policy and regulatory support for circular economy & water resource recovery                             |
| E. Water resource reuse can serve as a lens- and this will relate to valuation of wastewater in the context |
| of a circular economy: rethinking water reuse from a megacity perspective and linking directly with         |
| urban and regional planning   |
| technical elements (i.e. comparison between different treatments and with different types of                |
| water alternative to drinkable water (i.e. treated 'wastewater')  |
| governance (centralized/decentralized - drivers and bettlenecks for mutualization of                        |
| • governance (centralized/decentralized - drivers and bottlenecks for mutualization of                      |
| unconventional water resources and uses)  |
| Tunding (mancing opportunities for both of the above will figure into funding)                              |
| F. Social & Economic Value of Water: valuation and evidence   |
| how much should we monetize   |

| <ul> <li>how much evidence is enough (for whom and for what)</li> </ul>   |
|---|
| <ul> <li>how can data/evidence be visualized and communicated; enhanced communication and</li> </ul>            |
| visualization tools   |
| <ul> <li>how can regulation be linked to evidence</li> </ul>  |
| 6. Across themes – systems approach   |
| A. Framing adaptation challenges in monetary terms: economists tell us how to best allocate limited             |
| resources among multiple activities and finance actuates the economic resources that are necessary;             |
| Mechanisms for adaptive feedback loops; Advancing social and economic valuation of water                        |
| *see Workplan item CP2  |
| B. Scale challenges- building to and integrating with different scales (city, interdependent regions and        |
| uses), ; Building a Knowledge Network   |
| C. What makes systems change- tipping points, actors, new governance models; Institutionalizing                 |
| systems change and tipping points   |
| *see analysis in #1H above  |
| D. Integrated risk assessments to reduce uncertainty; Decision making under uncertainty                         |
| E. Systems Model re-organisation/antifragility; Framework for cross-sectoral integration                        |
| F. Common terminology and definition clarifications needed=> build a MAWAC glossary of terms                    |
| *see Workplan item A  |
| G. Social & Economic Value of Water: valuation and evidence   |
| <ul> <li>how much should we monetize</li> </ul>   |
| <ul> <li>how much evidence is enough (for whom and for what)</li> </ul>   |
| <ul> <li>how can data/evidence be visualized and communicated; enhanced communication and</li> </ul>            |
| visualization tools   |
| <ul> <li>how can regulation be linked to evidence</li> </ul>  |
| * see Workplan item CP2; this #6G subsection also touched on in the #6A subsection and is part of the entire #5 |
| Circular Economy research activity section as well  |
| 7. Technical Approaches and Needs   |
| A. Treatment Trains   |
| B. Sensors  |
| C. Models   |
| D. Digital Twins  |

E. Machine Learning/AI-powered data-driven decision support systems

## Appendix 1

# London Meeting, Day 2, Sept. 12 Snowball Exercise Breakout Groups: Report-Out Notes & Group Notes Themes 1 & 2

## **<u>Group 1</u>** (Veronique, Thu-Loan, Megan, Kuldip, Barnaby)

\*2 main underlined research topics a total of 5 bulleted research ideas (each bullet) w/in

- 1. Public Health & Environmental Indicators
  - public health and environmental indicators forecasting vector borne diseases
  - long-term monitoring of waterways to look at impact of climate change on public health/environmental health
- 2. Implementation and Evaluation
  - institutional frameworks & city structure; how does the structure/frameworks impact implementation success (i.e. interagency communications)
  - reconciling project planning & project budgeting timelines with forecastable knowledge; science about impacts
  - evaluating & identifying metrics of a project's success using community based/centric approaches

## Group 1 Detailed Notes of Themes 1&2 Breakout Discussion on Sept. 12th

"Public (and community and environmental) health" - One health

- <u>Research Topic 1:</u> studying the public health indicators, as defined but public health's disciplinary fields community health, environmental health, epidemiology and biostatistics, which could be usefully for forecasting vector borne diseases related to climate change.
  - The conditions that create vector borne diseases exist within our megacities. Knowing what public health indicators are for these conditions can support our ability to forecast/predict future harms of new/existing vector borne diseases
- <u>Research Topic 2:</u> Long term biological monitoring of waterways to see impacts of water quality changes within megacities

## "Implementation and evaluation"

- <u>Research Topic 1:</u> A proposed study of institutional frameworks/city structures (e.g., legislative models, governance, sociopolitical contexts) and their impact on the implementation and future success of climate adaptation/mitigation projects
  - Understanding/comparing the conditions within which climate adaptation/mitigation projects are developed, planned, and executed can help identify factors and strategic actions that make learnings and progressive actions replicable and adaptable in other geographic locations (i.e., adapting something working well in NYC in Chicago would require an analysis of what other structures/relationships facilitated that success to begin with)
- <u>Research Topic 2:</u> Applying community-based participatory research methodology (or another communitycentric method) to identify best evaluative measures/metrics for the implementation and sustainability of current/future projects.
  - The questions of "how well we know a project worked" should include the criteria of the people that will benefit/utilize the project products.
- <u>Research Topic 3:</u> Developing/Evaluating a mechanism to reconciling 3 key timelines that impact the feasibility of project: project planning timelines, budgeting time horizons, and implementation timelines determined by

future-focused modelling techniques (forecastable knowledge about modelled impacts e.g., climate/other future)

## **<u>Group 2</u>** (Christina, Mark, Graem, Ashish, Terri, Jennifer, & Karine)

\*2 main underlined research topics with a total of 8 bulleted research ideas within: this is a necessary big picture & comprehensive approach; however the various research ideas w/in can be parsed for funding..but need to keep track of what is done to ensure that we ultimately can build out all

- 1. <u>Research Accessibility</u>: review, CROCUS Framework and/or other similar comprehensive framework approaches to determine the applicability for use by the MAWAC group
  - develop playbook(s) that can be used by all (i.e. universalize approaches used by 5 cities to transfer scientific methods and research outcomes to local government)
  - establish standardized systematic pre/post data collection methods (both for bio-physical and social-technical efforts)
  - establish specific measures for understanding performance of initiative (i.e. nature based solutions like green/blue infrastructure)
  - carry out intercomparisons for with various water/climate models to see which work best and to reduce uncertainties
  - develop an approach/model to understand urban hydraulics (H&H models)

\*putting it all together: systematic data collection including that for performance assessment, testing models & ground truthing predictive models with collected data]

- 2. Research to Implementation
  - move toward using Digital Twins to test and poke system to optimize and plan, i.e. moving models/observations into actionable information- want to develop something that practioners can use (ideally going from scientific both bio-phys and soc-tech, outputs into understanding impacts and risk and vulnerability assessments)
  - develop visualization and data communication strategies to enhance visibility of outputs which is critical to the process (needed for bottom up, top down, and lateral communication processes)
  - develop processes and strategies for with practitioners and local government for scienceinformed, community-driven decisions

## Group 2 Detailed Notes of Themes 1&2 Breakout Discussion on Sept. 12th

- 1. Research the extensibility of the CROCUS and other research frameworks to the five cities (or a subset)
  - a. Develop playbooks
  - b. Standardize data collection
  - c. Understand the performance and maintenance of green infrastructure
  - d. Model (water management and climate) intercomparison to reduce uncertainties
  - e. Methods for urban hydraulics simulation (H&H)
  - 2. From research to implementation:
    - Digital twin to optimize and plan
    - Convert model outputs to impacts, to risk and vulnerability assessment
    - Visualization for communications with non-scientist stakeholders
    - Connecting with practitioners and local government for science-informed, community-driven decisions

## Group 3 (Franco, Felicia, Tom & Warren)

\*1 main underlined research topic with a total of 4 research ideas for comparative studies across MAWAC megacities. Could bundle into 1 big project or split into pieces (but again, ultimately want to ensure we have all pieces)

Finance vs. Economics (i.e. high level economic factors to be considered along with tradeoffs)

- 1. Policy/ Regulatory Drivers and Constraints: what are the policies and regulations that are drivers or constraints for how decisions are made?
- 2. Compare & standardize metrics for quantifying benefits & co-benefits of adaptation projects
- 3. Comparing different stakeholders visions (all stakeholders- govt, comm, private sectors) of short- and long-term change. For example, if we got them together about next year's fiscal budget they may all disagree, but if talk about 30 year timelines it be more likely for them to agree. Could interview stakeholder types individually and then bring together to potentially elevate the discussion.
- 4. Protocols for adaptive planning & maintenance: *at what frequencies have cities evaluated what they've been doing to fine tune/adjust what they're doing*?

## Group 3 Detailed Notes of Themes 1&2 Breakout Discussion on Sept. 12th

Our group began by framing the adaptation challenges we face in monetary terms. Adapting our water infrastructure will cost hundreds of billions of dollars (creating a large finance challenge). At the same time, decisions regarding associated infrastructure spending will likely be compared to other potential uses of public dollars (creating an economic challenge). Economists tell us how to best allocate limited resources among multiple potential activities. Finance actuates the economic resources that are considered necessary. (We feel strongly that economists need to be added to any research team we assemble).

With this pre-amble, we are interested in comparative studies across mega-cities focusing on:

- a) Policy and regulatory drivers and constraints to action
- b) Methods for quantifying benefits and co-benefits of different actions
- c) Multi-stakeholder visions for short-term and long-term change
- d) Protocols and schedules for adaptation planning and maintenance

## Group 4 (Jose, David, Sevin, Eloise, Pepe, Hannah)

\*1 main underlined research concept with a total of 3 research ideas

<u>Pathways to transformation</u> [assuming that cities are radically different so rather than researching differing city context that we instead what is common to all cities- in particular what has enabled change regardless of organizational/governing structures (looking for systematic enablers & disrupters; i.e. a 'Black Swan'= an unexpected event that shifts a change following some sort of 'disruption'; looking for good enablers/ disrupters). In short, instead of looking to see how we can retrofit cities, is there a way to think more iteratively about how to do big picture and implementation? What transended a governance strategy?]

- need to develop a more iterative process between strategic and implementation scales. Recognize there is tension at scales; tensions between strategic scale vs. implementation scale for planning.
- identify ways that job descriptions and organizations are flawed- need to move up & down
- develop a conceptual framework that identifies disrupters and enablers

## Eg disrupters/enablers

- ~ examples of choices that have allowed for blue-green implementation
- ~ DARPA in US is of major interest in UK
- ~ Bright spots- what was the disruption opportunity that they capitalized on and what were their tactics that allowed for the shift?

<u>Group 4</u> Detailed Notes of Themes 1&2 Breakout Discussion on Sept. 12<sup>th</sup> Scalar Systems Thinking and Planning; Ex: Meadowlands Commission / governance

#### Systems Approach Model

A systems approach model that helps to integrate different types of stakeholders into analysis for finding consistent and coherent solutions.

#### Working at Best Scale

How do we reconcile jurisdictional boundaries on all strategic scales? This requires regional adaptations to optimize planning and execution across various jurisdictions.

#### **Iterative vs. Centralized Planning**

Evaluating the differences and advantages between iterative planning processes and centralized planning models.

#### **Project Case Studies**

Project case studies conducted in different, sometimes inconsistent, contexts—focusing on lessons learned from fragmented versus centralized planning approaches.

#### **Target for Thematic Plans**

Aiming for thematic plans within larger integrative frameworks, such as heat plans and land plans, that address broader regional or sectoral needs.

#### **Conceptual Model**

The conceptual model emphasizes the creation of local energy plans or buckets, encouraging localized approaches to energy use and sustainability.

#### **Create a Virtual Landscape of Stakeholders**

Developing a virtual landscape that maps out climate stakeholders to facilitate potential collaborations and shared initiatives.

#### **Data Sharing Platform**

A data-sharing platform helps identify best practices by consolidating information on location, people, outcomes, lessons, and ongoing maintenance.

#### Assessing Ideas for Regulatory Consistency

Evaluating various ideas and their consistency with regulations, particularly in the context of retrofitting the housing market.

#### **Incentivize Transitional and Incremental Changes**

Proposing transitional and incremental changes through parallel mechanisms like the LNIP seat and Section 106 in London to facilitate steady progress.

#### **Incremental vs. Transformational Adoption**

Focusing on the long-term nature of change, highlighting the importance of both incremental and transformational policy shifts to reflect long-term transformative cycles.

#### **Create Communication Channels for Climate Concepts**

Encouraging the development of communication channels focused on climate concepts, and supporting the establishment of local climate panels, like with NPCC.

#### **Hypothesis and Challenge**

The best practice approach for scalar systems thinking and planning in the absence of governance constraints. What holds true for all cities, regardless of jurisdictional differences? Is there a consistent system that can be applied across these contexts?

#### **Constants: Community and Resilience**

Community resilience remains a constant element in all planning processes, with a need to engage communities and ensure their adaptive capacities.

### **Political Timelines and Local Coordination**

Political timelines, especially within local corridors like the East Corridor, must be considered when developing strategies for scalar systems thinking and planning.

\*The discussion on disruptors and enablers to unpack processes.

## Sept. 12<sup>th</sup> Snowball Report Out Summary & Comments:

Interesting and exciting to see the different approaches each group took and the varying thinking styles that we've got in the room for engaging in future work- this latter piece will be super important to our success. Will need to employ all types of approaches- top down and bottom up (and sideways when appropriate) as well as take advantage of all thinking styles as we move forward with our MAWAC research activities. Whatever we land on to carry forward for research- we must make sure that these research ideas are well aligned with city's short-and long-term needs and priorities (we must have city buy in).

- Groups 1-3 on more parallel paths and suggesting more baseline/systematic approaches for incremental change
- Group 4 is more visionary for transformational change based on a looking for shocks to system(s) that allowed for change. \*Note from Megan related to this and from a continuing discussion of group 4's approach that's important to keep in mind: "Exogenous shock isn't something we can control, but what's important is what are the social, political, econon dyanmics that unforlded after those exogenous shocks. What was in place to allow spiral of change. What's integrates is need social system dynamics, and solution stream. Not about the shock but what happens after the shock."

# London Meeting, Day 3, Sept. 13 Snowball Exercise Breakout Groups: Report-Out Notes & Group Notes Themes 3 & 4 (kind of all 4 themes)

## Group 1 (Veronique, Thu-Loan, Megan, Kuldip, Barnaby)

\*4 main research topics

- 1. Develop Social Valuation of Water
  - need to quantify value of water that's sensitive to social context that can leverage finance to invest in water projects/water security
  - similar to the social cost of carbon concept with a benefit of leveraging private finance for water projects (i.e. like 'net zero water')
- 3. Build shared 'framework' for
  - a. baseline data (benchmarking)
  - b. biogeochemical monitoring approaches for water quality
  - c. comparative regulatory regimes
  - to be used across all cities (building data infrastructure for a network of networks)
- 4. Build frameworks and enabling technologies for
  - a. meaningful and sustained community engagement for use in decision making at city level (i.e. ensuring that 'community voice' is effectively integrated into frameworks and therefore captured for decision makers)
- 5. Expand Ashish's EJ's toolkit for social/political context that is justice oriented

## Group 1- Detailed Notes of Themes 3&4 Snowball Breakout Discussion on Sept. 13th

Quantifying the social value of water

- Volunteer-based replenishments and monetizing (same as carbon sdg goals)
  - Sociocultural dynamics per-capita water use and conservations (how circular economy may intersect)
    - So that companies working on net-zero water can determine their investment in a project that develops that.
    - Support financing water projects and water security
- Shared data and monitoring regime for water quality
  - H2O testing before and after community construction projects that support climate change
  - Informed my comparative analysis on the regulatory regimes and contexts across megacities
- Expanding the EJ urban toolkit from Chicago by using justice-based, historical, and social conditions/facts shared in all other megacities to ensure that this research tool can be used elsewhere
  - Those conditions or facts include:
    - Lack of infrastructure for water/infrastructure that is overcapacity
    - Historical disinvestment in neighborhood most at risk/flood vulnerable
    - Multiple city actors not quite communicating
    - Rapid development >> gentrification
    - Academic fortitude
- Building scientific framework for sustainable community engagement to reduce community fatigue and the challenges/harm posed to city and academic entities seeking community input
  - Designed to offer payment to community groups often tapped to support the success of water and climate projects
  - Should support participatory decision-making within a city at all levels
- Network of Networks
  - Building the technological architecture for network of network concept but that incorporates a research goal of future-proofing megacities
  - Leverages:

- Community as experts
- Technology as a conduit
- Utility groups as accountable, ethical, responsible actors

### Group 2 (Christina, Mark, Graem, Ashish, Terri, Jennifer, & Karine)

\*1 main underlined research topic- building out big research idea from Sept. 12 into something practical/manageable <u>Create systematic approach for information collection & comparative assessments</u>

- 1. Need baseline Information for each city and therefore need to define multiple categories for analysis and collecting information-could then create templates for information collection per category/topic, i.e.
  - ~ water resource management
  - performance assessments of, for example nature based solutions (NbS) and/or grey infrastructure approaches
  - ~ community engagement
  - ~ finance and budget
  - ~ governance & regulatory structures
- 2. Evaluate and identify best practices in each city based on an agreed upon criteria
- 3. Using all of above, build out a toolkit(s) that can be used by all megacities (and transferable to other partner cities/regions), i.e.
  - ~ toolkit for data benchmarking
  - ~ toolkit for performance assessments (bio/phys and social technical)
  - ~ toolkit of operation and maintenance
  - ~ toolkit for identifying gaps
  - \*need to define what we mean by toolkit that can be usable and actionable for all cities
- 4. Create a virtual library where data could be stored- data management

#### Group 2 Detailed Notes of Themes 3&4 Snowball Breakout Discussion on Sept. 13th

-> From big research idea from Sept. brainstorming towards practical and translational, more short-term ideas that can be done easily.

->Merging with themes 1,2,3,4:

### Central idea- need to develop systematic approach to do comparative assessment of what is going on.

- Several topics in the list, including community engagement, citizen/community science, economic valuation of co-benefits, what worked and lessons learned and failures, and develop toolkits/playbooks, filling data gaps.
- Central topic: Baseline common assessment of where each megacity is that's organized by topic/spokes/subtopics

## Eg. Spokes or subtopics

Community:

- Local government framework such as NY's community boards
- Define "community" and develop best practices for community engaged research, what do we mean by it?
- User needs: determine requirements, stakeholder analysis and engagement, community awareness (advocacy groups).
- Engagement and community mentors, NGOs, community members (paid) and citizen scientists
- Discrete measurements NbS performance .... Assessment, water quality
- Public engagement, how to recalibrate the balance between professional engineers and advocates and general public/committees to "get things done"
- Citizen observational data capturee (application)
- Public value added to benefits monitoring (for now)
- Develop common approach to quatify and value co-benefits and non-monetized ecosystem services
- How can we enable placemaking through GI for water as planned , not opportunistic

- Legal/regulatory baseline, comparative, consent decrees/EPA regs, warranty ...... → data
- Larger/international community; C40,

Best practices:

- Need to identify economists for MAWAC teams
- Identify best practices with quantitative analysis in .... Areas community engagement, GI, partnerships, monitoring, models
- Risk management: contingency analysis and tools to account for significant impacts (may be black swan); checklists that are checked based on measured performance metrics (see back)
- What policies are best suited to advance innovation in resilience and adaptation to make things happen
- Examine failures and lessons learned

Developing toolkits (this is mixed with best practices):

- Develop water and management climate toolkits, standardize best practices. Develop ..... for the 5 cities
- Standardized understanding of data (from models and observations)
- Integrated water management. Dial with subsurface disturbance infrastructure, data issues for models. E.g. aging infrastructure/modernization; central, decentralized infrastructure.

Plans for strategic partnerships and organic collaborations

## **<u>Group 3</u>** (Franco, Felicia, Tom & Warren)

\*still same 1 main underlined research focus but added 3 additional research ideas (i.e. from Sept. 12<sup>th</sup> there were 4 ideas) <u>Finance vs. Economics</u>

- 5. Circular Economy
  - a. source control, residual management (both upstream demand management & downstream residuals in water cycle)
  - b. identify examples of successful waste elimination in water cycle
- 6. Valuation Process (risk/public value analyses)
  - how do you pick metrics and how to value? Need a valuation process of benefits/co-benefits that connect to local values and possibly monetize local/public value and link to engagement process (see Graeme's Sept. 12<sup>th</sup> presentation)
  - need to quantify cost of inaction and 'business as usual infrastructure investment in context of climate change [\*note from Ana: did something like that for the London water neutrality work. Note: BAU needs to be defined.]
- 7. Engagement & Communication
  - a. Identify successful public/interagency/government engagement and notification strategies [\*note from Ana: need to define 'successful']
  - b. Identify how cities are justifying to public the unprecedented investment needs [\*note from Ana: need to define 'unprecedented']

<u>Group 3</u> Detailed Notes of Themes 3&4 Snowball Breakout Discussion on Sept. 13<sup>th</sup>...also building off of Sept. 12<sup>th</sup> discussions

- a. Source control and residual management actions to support the circular economy for water
- b. Converging on a process based on local stakeholder value for selecting benefits and co-benefits to measure, (possibly) monetize, to incorporate into risk assessments
- c. Investigate how cities and water utilities are funding and justifying to the public unprecedented infrastructure investments brought about by climate change
- d. Quantify the costs of inaction and business-as-usual infrastructure investments in view of actual climate adaptation needs
- e. Gather examples of successful and unsuccessful waste elimination efforts in the water sector

f. Conduct a survey of successful public engagement and notification strategies and how they occur between utilities and the public, between the public and the utility, across governmental agencies and scales, and between practitioners and governmental leaders

## Group 4 (Jose, David, Sevin, Eloise, Pepe, Hannah)

\*1 main research concept with a total of 3 research ideas

<u>Water Reuse as Lens- Valuation</u> in context of circular economy; rethinking water re-use from a megacity perspective and linking directly with urban planning. Urban planning with regard to history and historical landscape (i.e ecology, geology, industry, real estate development etc): what are the cities we want to live in?; how do we want to live in these cities?; how can we intervene on a local level?

- 1. Circular Economy & Reuse? What does water reuse mean in context of circular economy & how do we position water reuse as an intervention in multiple domains: reuse what, for what, where? how can we position water reuse as an intervention of integrated water management? What is it?
  - ~ technical element
  - $\sim$  funding
  - ~ governance (centralized/decentralize)
  - I. Jose notes 'landscape fingerprint' concept
  - *II.* Sevin notes that archaeology (material history of human settlement) is tied to geology when understanding urban landscape forms. Ex: definition of parks
  - *III.* David frames reuse in terms of rethinking carrying capacity and the necessity of cohabitation with nature (multispecies, flooding, etc). Banks and the Global Commission on the Economics of Water are interrogating this. Spotlights reuse.
- 2. Engagement
  - ~ funding/financing; how to fund?
  - ~ scale: spatial & temporal
  - ~ behavior intervention
  - defining 'engagement'- need clear terminology- outreach, education, engagement- all different things but can inform/enable eachother
- 3. Value, valuation & evidence
  - ~ how much should we monetize?
  - ~ how much evidence is enough and for whom and for what?
  - ~ how can data/evidence be visualized and effectively communicated?
  - ~ Role of regulation and how can regulation be linked to evidence?

Group 4-no detailed notes provided

## Next steps

## Ana Notes Broader From Broader Collective Conversation:

Jennifer: need glossaries across fields and professions

<u>Cristina</u> – Consider creating a strategic document that unites the work we are all doing. To fund projects, we must show we have agreed on something and have a level of collaboration. A couple position papers would be one step towards showing we can work together. This would be the foundation for collaborative work. These papers identify low-hanging fruit and urgent needs vs. longer term projects that require more thought.

<u>Ashish</u> – Do we need a website for public visibility? So we're known as a collaborative group and can keep in contact with each other. This requires some research around where it would live and how we are sponsored.

<u>Felicia</u> – We need an ecosystem for maintaining our collective 'we' and projects (position papers) that establish the 'we'. We also need

- 1. a template to organize ideas generated here.
- 2. In addition, some projects that can move forward as one-offs. One-offs are important for sustained city involvement.
- 3. Longer term big projects and collective calls for research (position papers).

<u>Ashish</u> – We must decide on role definition and division of work moving forward.

<u>Ana</u> – Be realistic about what we can do. Papers are relatively easy for academics. Two papers here:

- 1. 'What it is now' Defining a methodology for the benchmarking of megacities in context of water management.
- 2. 'What is the future?' Forward looking for interdisciplinary perspectives on the future of megacities with regard to water and climate.
  - a. Mark responds: The first paper is great, but the second paper harder to imagine without the benchmarking context.
  - b. David responds: there is content and case studies from each city on water reuse, which is one reason we identified it as a unifying lens and potential topic

<u>David</u> – Get guidance from UNESCO about strategically producing work along their priorities and document formats. MAWAC's mission for these groups is more 'what is now,' but other UN models (UN Habitat i.e.) Have 4 categories and divide work accordingly:

- 1. What is happening
- 2. What matters most
- 3. What can we do about it
- 4. Are we doing it

<u>Kuldip</u> – If we are writing baseline documents that describe context and benchmarks, we will need to ask cities for lots of information they may be reticent to give.

1. Ana, this could be a discussion point in the benchmarking paper

<u>Cristina</u> – We may need to list as challenges the fact that we need to get local gov support for doing this, since they own the data etc. If you write a position paper, you don't need to analyze the data; instead identify pathways to access and analyze the data on a city-by-city basis.

Ashish – These are viewpoints and position papers; perspectives