

Advancing climate action through WASH services

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Environmental impact

Biodiversity and ecosystems

Air, soil and water

Forests and biobased resources



Urban planning

Climate

Energy

Transport and mobility

Governance

Policy and economics



Circularity, waste & resource flows

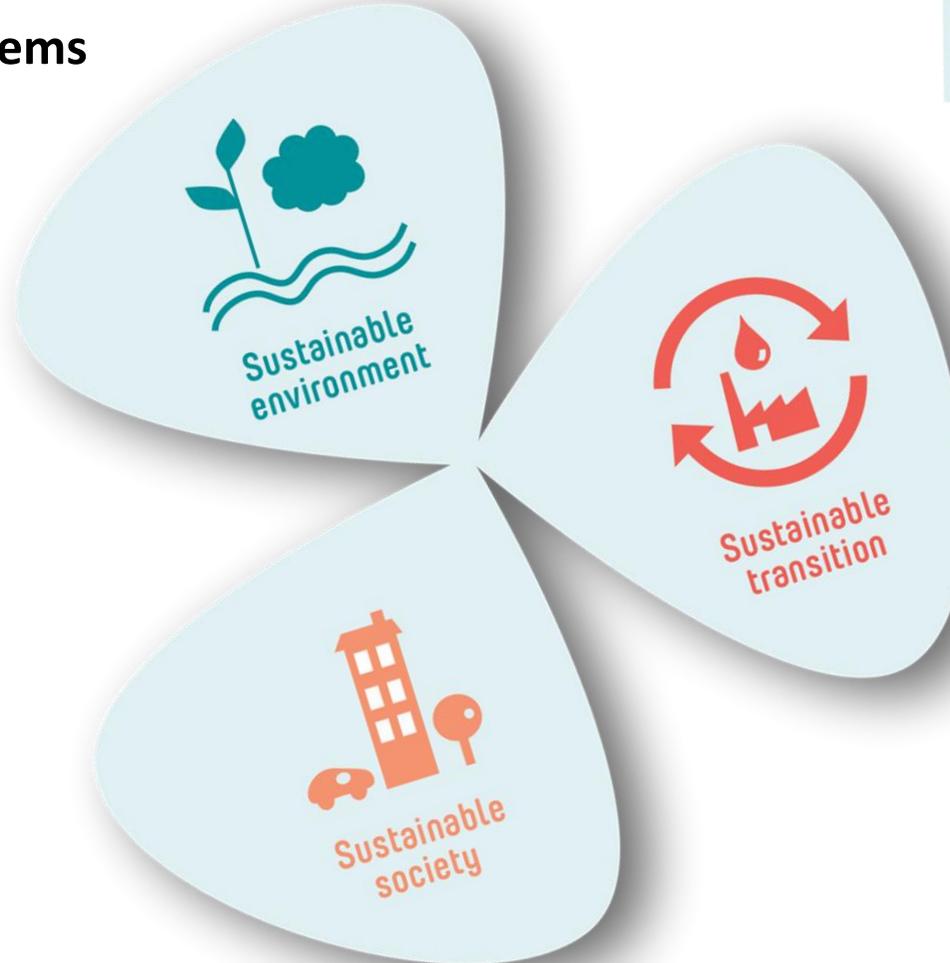
Environmental technologies

Wastewater

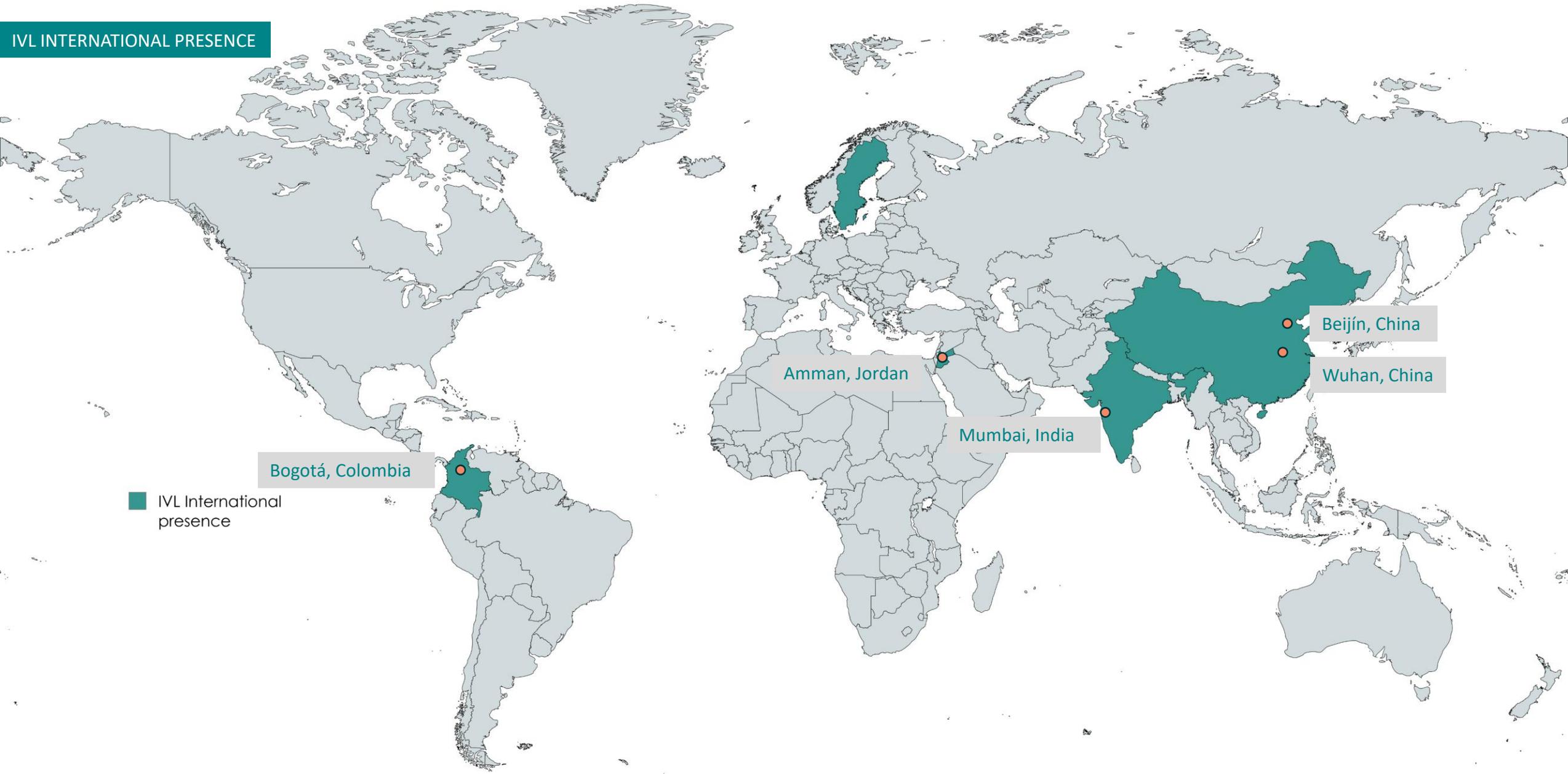
Sustainable procurement

Sustainable Chemistry

Digitalization/AI



IVL INTERNATIONAL PRESENCE



■ IVL International presence

Bogotá, Colombia

Amman, Jordan

Mumbai, India

Beijín, China

Wuhan, China

Co-benefits of investing in WASH

CO-BENEFITS OF INVESTING IN SAFE DRINKING WATER, SANITATION AND HYGIENE (WASH)



HUMAN HEALTH AND WELL-BEING CO-BENEFITS INCLUDE

1. **Cuts diarrhoea and infection risk** → 1.4 million deaths and 74 million DALYs¹ attributable annually to unsafe WASH; diarrhoea risk drops by up to 52 per cent with basic WASH improvements
2. **Delivers highly cost-effective hygiene prevention** → handwashing reduces diarrhoea by 30 per cent and could prevent 96 million cases of diarrhoea and 160 million respiratory infections annually
3. **Cuts cholera risk** → 2.86 million cases & 95,000 deaths annually (uncertainty: 1.3–4.0 million); safe water and sanitation remain the most effective long-term prevention
4. **Prevents child undernutrition** → unsafe WASH contributes to 10 per cent of global undernutrition; improved sanitation associated with a reduction in stunting of between 16–39 per cent
5. **Protects from neglected tropical diseases** → unsafe WASH drives soil-transmitted helminths (STH) infections,² affecting more than 1 billion people, and schistosomiasis³ causing 1.6 million DALYs annually, as well as trachoma which affects 1.9 million people annually, and puts 103 million at risk
6. **Strengthens epidemic and pandemic preparedness** → safe WASH is essential to control the spread of cholera, Ebola, COVID-19 and other infectious diseases; weak hygiene infrastructure accelerates viral transmission
7. **Reduces health care-associated infections and sepsis** → there are 48.9 million cases of sepsis annually, with 11 million deaths; up to half of health care-associated sepsis is preventable with reliable WASH and strong systems to prevent and control infection.



SOCIAL AND ECONOMIC CO-BENEFITS INCLUDE

8. **Boosting economic returns and productivity** → spending \$1 on sanitation brings a return of \$5.50; poor WASH costs 2–7 per cent of GDP in many low and middle-income countries (LMICs)
9. **Reducing poverty and inequity** → low-income households often pay much higher unit costs, sometimes by a factor of up to 30–40, for unsafe or vendor-supplied water
10. **Creating jobs and enterprises** → local businesses in construction, operations and maintenance, desludging; opportunities especially for women and young people
11. **Improving school attendance and learning** → reduces absenteeism by 20–50 per cent; menstrual hygiene can reduce between 27–41 per cent of missed days in some settings
12. **Strengthening women's safety, dignity and leadership** → safe, private sanitation reduces risks of harassment and violence; but women hold fewer than 18 per cent of WASH jobs and remain underrepresented in utility leadership
13. **Helping break time-poverty for women and girls** → women and girls spend 200 million hours daily collecting water – time lost from schooling, income and leadership opportunities, reinforcing gender inequality
14. **Preventing conflict and building peace** → children aged 5 and under in conflict zones are three times more likely to die from WASH-related disease than violence; inclusive WASH builds social cohesion and stabilization
15. **Strengthening community resilience** → resilient services prevent outbreaks post-disasters and restore livelihoods

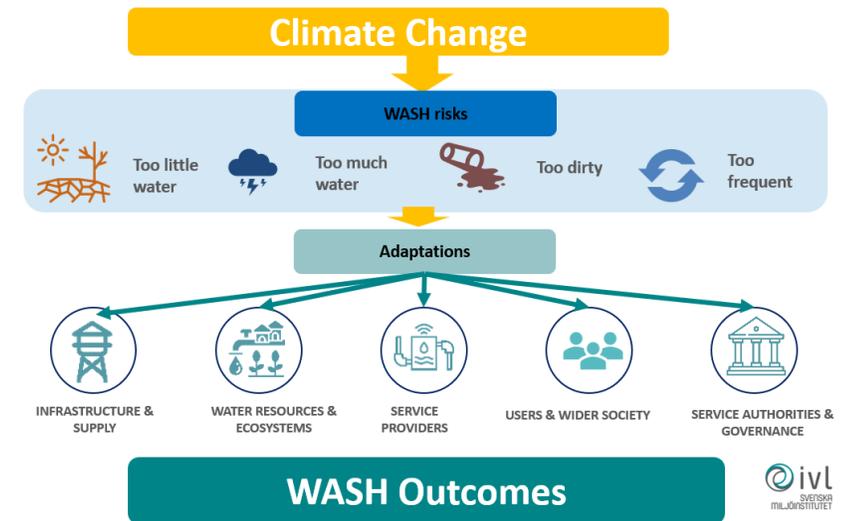
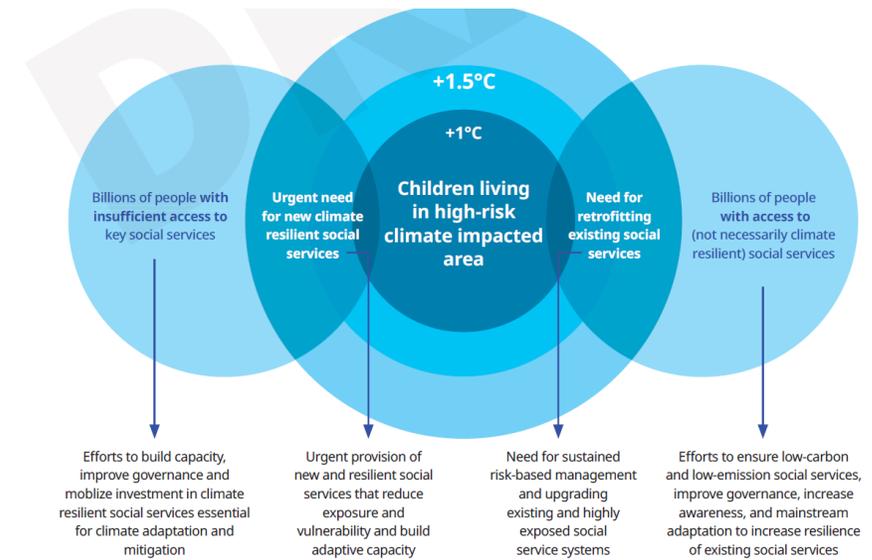


ENVIRONMENTAL AND CLIMATE CO-BENEFITS INCLUDE

16. **Protecting ecosystems from pollution** → approximately 58 per cent of coral reefs & 88 per cent of seagrass beds are exposed to wastewater nitrogen
17. **Driving a circular economy and resource recovery** → advanced treatment can recover up to 90 per cent of water and nutrients, producing reclaimed water, fertilizer and energy
18. **Nature-based solutions strengthening resilience** → the construction of wetlands, mangrove restoration and green infrastructure improve water quality, regulate floods and enhance ecosystem services; scaling-up requires stronger governance and investment
19. **Enhancing climate adaptation** → WASH is front-line defence against floods, droughts, heatwaves; protects health and livelihoods
20. **Reducing greenhouse gas emissions** → sanitation accounts for around 4.7 per cent of global methane; upgrades can cut these emissions by more than 50 per cent
21. **Improving energy efficiency and reducing costs** → water sector uses approximately 4 per cent of global electricity; NRW (non-revenue water) reduction can potentially cut greenhouse gases by more than 25 per cent
22. **Supporting nature-based and circular solutions** → wetlands, reuse, sludge-to-biogas increase biodiversity and carbon storage
23. **Bridging climate policy and finance gaps** → WASH is underrepresented in NDCs (nationally determined contributions) and NAPs (national adaptation plans); stronger metrics can unlock climate funding.

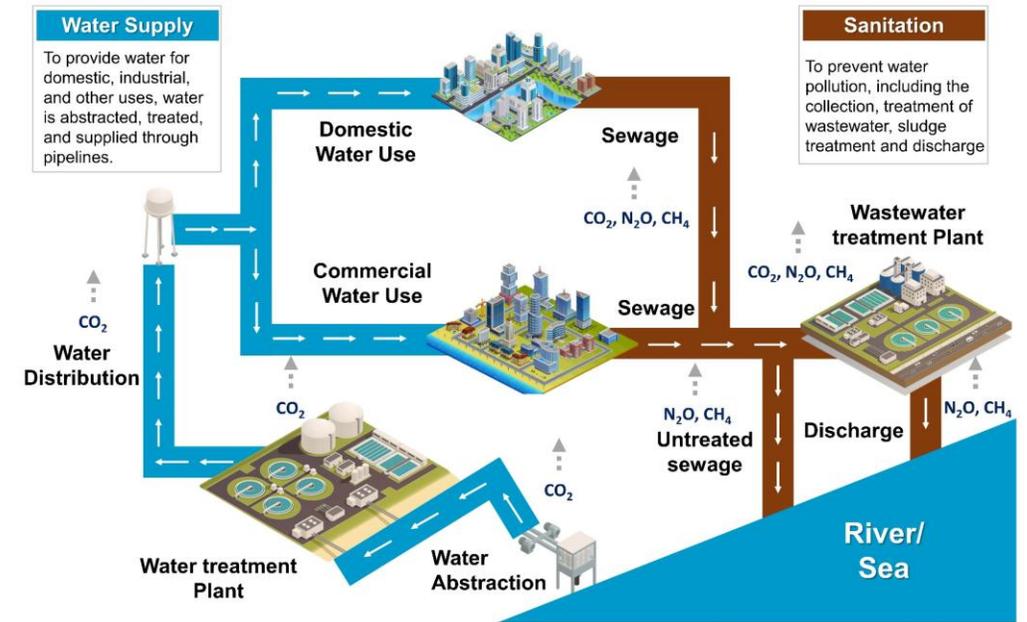
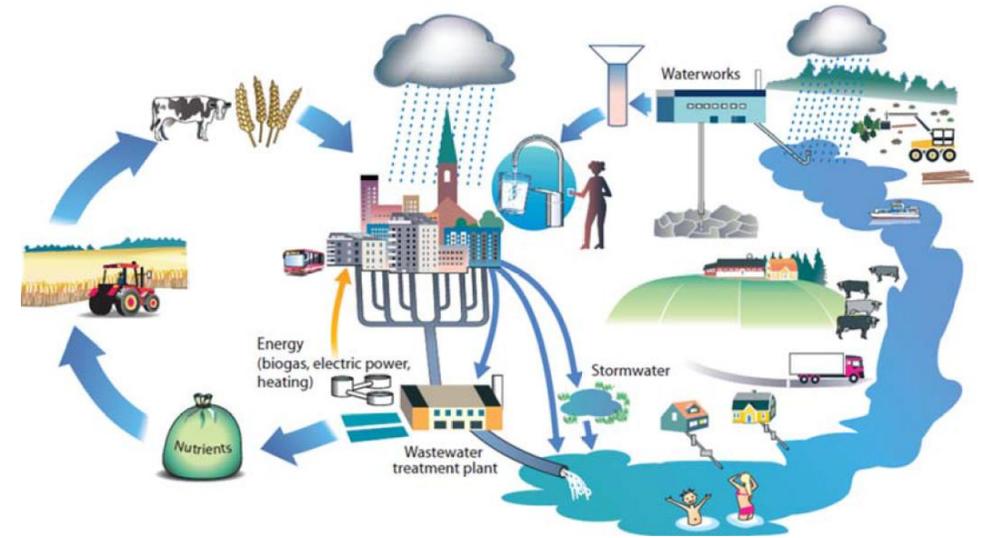
Adaptation co benefits

- Climate-resilient WASH systems are essential for health and recovery, **reducing post-disaster disease outbreaks by up to 60%** through risk screening, redundancy, and diversified water sources.
- **Reducing wastewater pollution strengthens ecosystem-based adaptation**, protecting reefs and seagrass that buffer storm surges and sustain fisheries—yet ~58% of coral reefs and ~88% of seagrass beds remain exposed to wastewater nitrogen.
- **Safe wastewater reuse and nutrient recovery enhance drought resilience**, providing reliable alternative water supplies and circular resources—advanced systems can recover up to ~90% of water and nutrients where feasible.
- **Nature-based solutions strengthen resilience** → Constructed wetlands, mangrove restoration, and green infrastructure improve water quality, regulate floods, and enhance ecosystem services; scaling requires stronger governance and investment.



Mitigation co benefits

- **WASH has significant but underexplored mitigation potential**, with sanitation and wastewater accounting for ~1.6% of global GHG emissions, mainly methane and nitrous oxide.
- **Non-sewered sanitation is a major emissions source**, emitting 377 Mt CO₂e annually, yet achieving universal sanitation under SDG 6.2 would increase global emissions by less than 0.2%, aligning with climate goals.
- **Energy use in water and sanitation systems drives rising indirect emissions**, as the sector consumes ~120 Mtoe per year, or about 4% of global electricity demand.
- **Mitigation pathways** include efficiency and circular solutions, such as process optimization, biogas recovery, clean energy integration, non-revenue water reduction, constructed wetlands, and nutrient recycling, delivering ecosystem and resource-efficiency co-benefits.





What does Climate Resilient WASH look like?

Definition

Climate-Resilient WASH Services anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, so as to bring ongoing and sustained WASH services to the current and future users

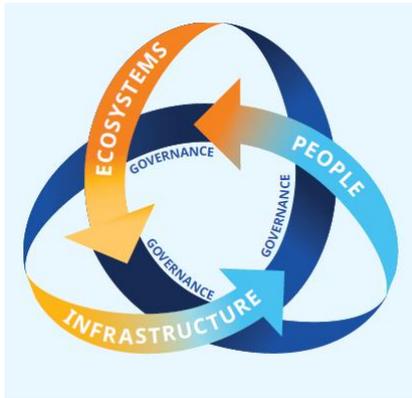
Definition of climate-resilient water, sanitation and hygiene services

Definition:

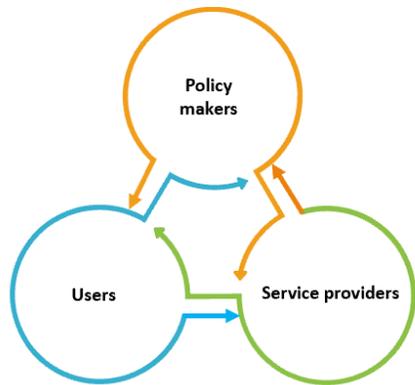
Climate-resilient water, sanitation and hygiene services anticipate, respond to, cope with, recover from, adapt to or transform based on climate-related events, trends, all while striving to achieve and maintain universal and equitable access to safely managed services, where appropriate minimising emissions, and paying special attention to the most exposed vulnerable groups.

→

Solutions in the different components of the hydro-social system

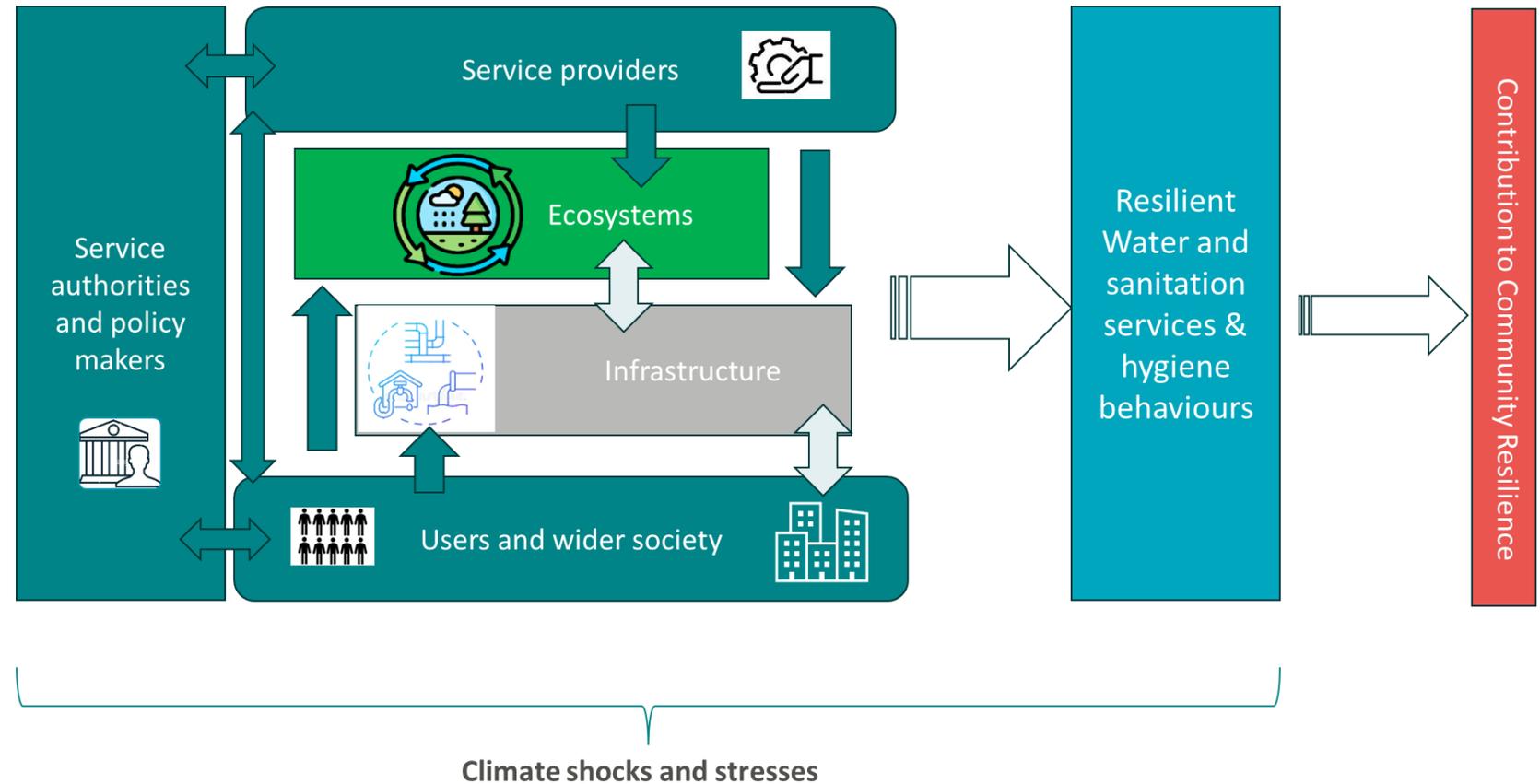


The system



The key actors within the system

The set of actors and physical components of the system interact with each other to deliver resilient water and sanitation services



National Level Outputs

(Menu of potential options)

Service Authorities

(Focus: policy, regulation, coordination, standards, financing, monitoring)

Service Providers

(Focus: application of service standards, systems to support preparedness, financial resilience, innovation, data use)

Infrastructure

(Focus: design, O&M, asset management, resilience upgrades, GHG mitigation)

Water Resources And Ecosystems

(Focus: ecosystem protection, integration with WRM, data, nature-based solutions)

Users And Wider Society

(Focus: awareness, participation, accountability, inclusivity, equity, social transformation)

A.1 National standards and guidelines for climate-resilient water and sanitation services (for various settings i.e. rural, urban, healthcare facilities) are developed or adapted, institutionalized, and enforced, covering emergency preparedness and

business continuity, climate risk assessment and planning, infrastructure design, financial safeguards, and equity and other considerations for climate-exposed

Alignment and cooperation/coordination between national climate priorities in sector planning and processes (e.g. Joint Sector Reviews, National Adaptation Plans, NAPs and NDCs).

Policy and regulatory institutions and mechanisms for water and sanitation, water resources and ecosystems management, are established and enforced to ensure compliance with resilience standards, safeguard service delivery, and promote inclusive and equitable service delivery.

B.1 National standards for service continuity, quantity, quality and recovery time related to climate events are established (e.g. Climate resilient water safety planning).

B.2 Climate hazard emergency preparedness and business continuity are institutionalised, including thresholds for implementation of emergency plans.

B.3 Data-informed adaptive management is institutionalized, with service providers collecting, reporting, and using climate-sensitive performance indicators and systems established to provide hydrological/climate data to service providers to guide operations and planning.

C.1 National standards and technical guidelines for infrastructure incorporating hazard-specific risk considerations, equity, resilience attributes (robustness, flexibility, redundancy, modularity) and options for NbS, greenhouse gas mitigation and circular economy (e.g., renewable energy, water-use efficiency, water reuse/recycling, energy recovery, non-revenue water reduction measures, low-carbon construction materials) are established.

C.2 Climate risk assessments and adaptation planning are systematically integrated into infrastructure feasibility studies, design processes and national investment planning.

D.1 Nature-based solutions and water conservation are embedded in national strategies for source water and catchment protection, wastewater treatment, and in combination with grey solutions as necessary.

D.2 Institutional frameworks and intersectoral coordination mechanisms between actors responsible for water, sanitation and water resources management are established or strengthened to enable joint planning, monitoring, and allocation that incorporates climate risks and uncertainties.

D.3 Shared early warning systems, ensure water availability for service provision, and limit wastewater pollution during and after climate events.

E.1 National guidelines and standards for inclusive service design are updated and enforced to address the differentiated needs of women, children, persons with disabilities, Indigenous peoples, and other marginalized groups.

E.2 Community engagement frameworks and accountability mechanisms are institutionalized to ensure inclusive participation in water and sanitation-related climate risk management and decision making at national, subnational and community levels.

E.3 Coordinated mechanisms for social protection and equity are established to ensure continuity and affordability of water and sanitation services for the most vulnerable during climate shocks and crises, including incorporation into social protection schemes.



SANITATION AND WATER FOR ALL
Climate Task Team

Definition of climate-resilient water, sanitation and hygiene services

Definition:

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Sub-National and Local Level Outputs

(Menu of potential options)

Service Authorities and Governance

a.1 Land use, planning and reallocation processes are in place to reduce population growth and settlement in high climate-risk areas.

a.2 Climate-informed early warning systems and contingency mechanisms are in place at sub-national and local levels to anticipate, respond to, and recover from climate-related disruptions in water and sanitation services.

Horizontal coordination between sub-national authorities, and vertical coordination structures between sub-national and national authorities are operationalized for planning, coordination, and response.

Minimum standards for climate-resilient water, sanitation and hygiene services are established through licensing, permits and monitoring for independent oversight of service provision.

Service Providers

b.1 Coordination mechanisms among sub-national service providers are established to enable resource sharing, technical assistance, and joint emergency response across municipalities and districts.

b.2 Service providers are trained, equipped and financed to enhance preparedness and operational continuity and quality under climate stress, using updated tools and where possible, real-time data systems.

b.3 Service delivery preparedness, emergency and continuity plans (covering emergency protocols, backup systems, and flexible delivery arrangements) are operationalized by service providers to respond effectively to climate-related disruptions.

b.4 Performance monitoring systems include climate-sensitive indicators to track resilience and equity in service provision, integrating digital and data-driven tools for real-time analysis and predictive maintenance, with results informing adaptive planning and accountability.

Infrastructure

c.1 Climate-resilient and inclusive WASH Infrastructure designed and implemented across sub-national and local projects (including for schools, healthcare facilities, and communities) to minimize the consequences of failure and enable rapid recovery from climate shocks and facilitate equitable access.

c.2 Critical water and sanitation infrastructure (e.g., reservoirs, supply lines, treatment and drainage systems) is relocated, elevated, upgraded, and maintained to ensure reliable functionality during extreme climate events, with redundancy and diversity built into service models (e.g., backup communal toilets, rainwater harvesting or storage systems, water tankers) to sustain access when primary systems fail.

c.3 Greenhouse gas emissions are managed through solar-pumping, non-revenue water reduction measures (including leak detection, pressure management, and network rehabilitation), water recycling, use of low carbon construction materials, water efficiency and conservation, optimisation of wastewater and faecal sludge treatment processes including methane capture or waste-to-energy systems.

Water Resources and Ecosystems

d.1 Inclusive catchment-level governance structures are established and resourced to coordinate equitable local land-use, water allocation and ecosystem protection across municipalities.

d.2 Coordinated action across different actors-solid waste, agriculture, industry, water resources to reduce the impact of human activities on water related ecosystems.

d.3 Ecosystems supporting WASH services (e.g., forests, wetlands, watersheds) are protected, managed, and restored in areas vulnerable to climate stress.

d.4 Groundwater and surface water resources and related ecosystems are monitored and managed, identifying ecological and water resource thresholds using localized, climate-smart tools and community-based systems.

Users and Wider Society

e.1 Awareness and behaviour change campaigns are rolled out at scale, informing users about climate risks, water conservation, hygiene practices, and preparedness, coping and recovery measures.

e.2 Create public demand for climate-resilient and safely managed water, sanitation and hygiene services and incentivize members of the public to upgrade to safely managed water and sanitation services (e.g., make use of desludging services, connect to utility water supplies instead of using unsafe sources)

e.3 Participatory approaches are utilised to draw on diverse local and traditional knowledge bases to inform the identification of climate risks, the design of solutions and local constraints.

e.4 Community-based risk mapping, preparedness, and response planning mechanisms are established to enable locally tailored resilience actions.



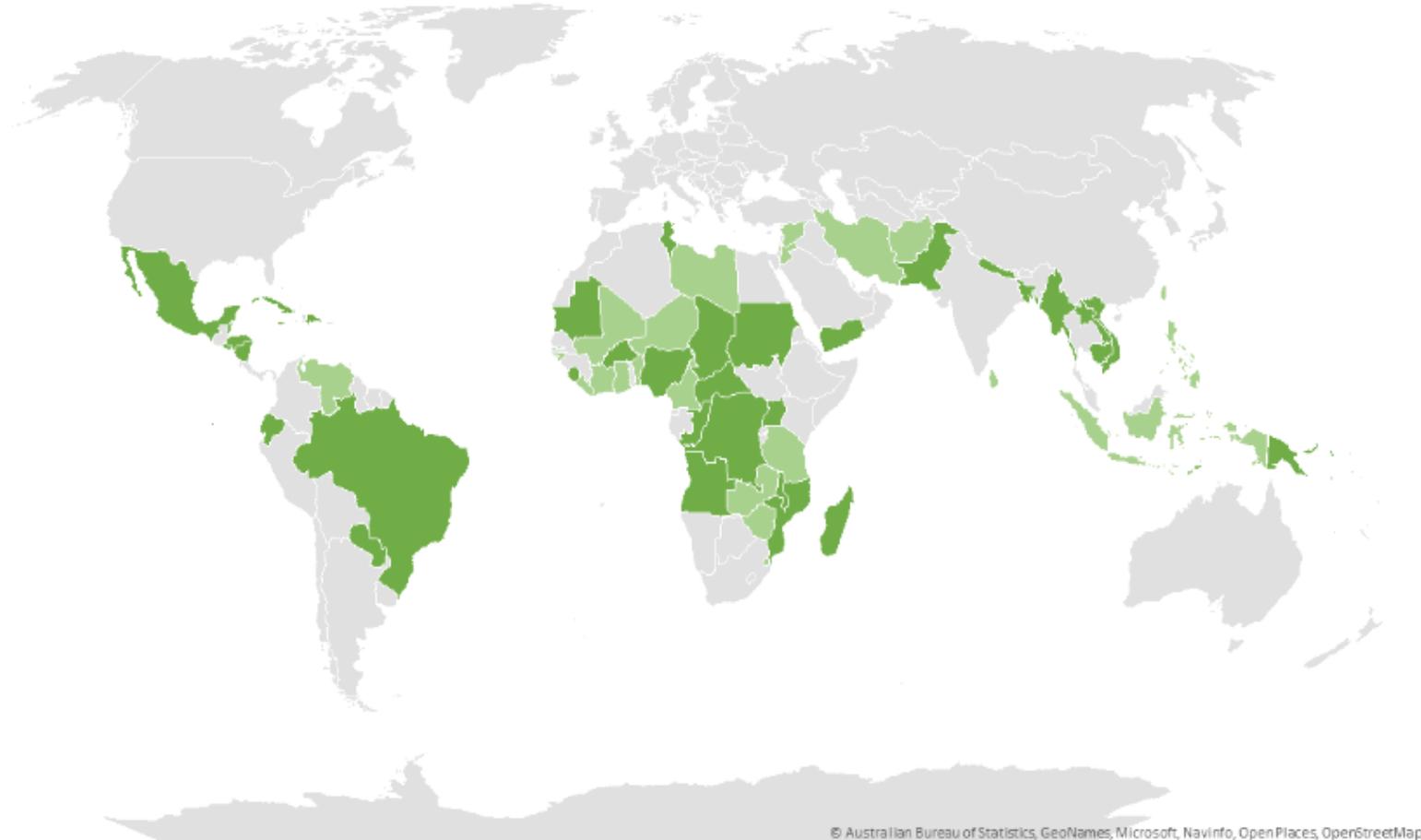
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40+ countries supported to incorporate climate risks into WASH service delivery

IVL Support to building climate resilient water and sanitation services (ongoing / completed) - from 2021 until now



■ Support to building climate resilient WASH completed ■ Support to building climate resilient WASH ongoing

What is a Climate Rationale

The climate rationale is a document intended to help the water, sanitation and hygiene sector strengthen its resilience to climate change.



Situation analysis on the latest climate science knowledge for the country



Understands the consequences of climate trends for the WASH sector



Assessment of the coherence between climate action and WASH in the country



Proposes adaptation and mitigation solutions



Adapt ongoing WASH programmes & strategies to current & future climate challenges at all levels



Anchor WASH in national & local climate strategies (NAP, NDC, NWS, etc.)



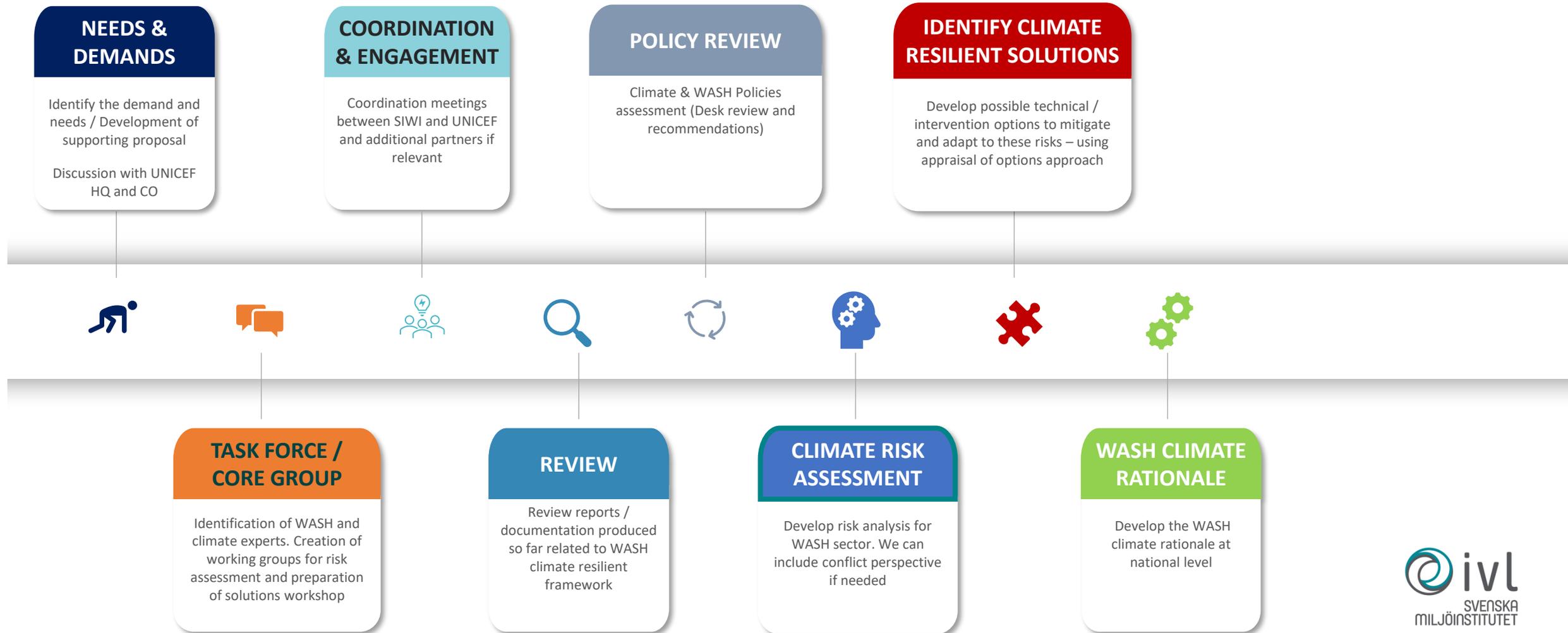
Support sector efforts in transitioning to climate-resilient services



Provide evidence for the development of climate finance proposals, e.g., for the GCF

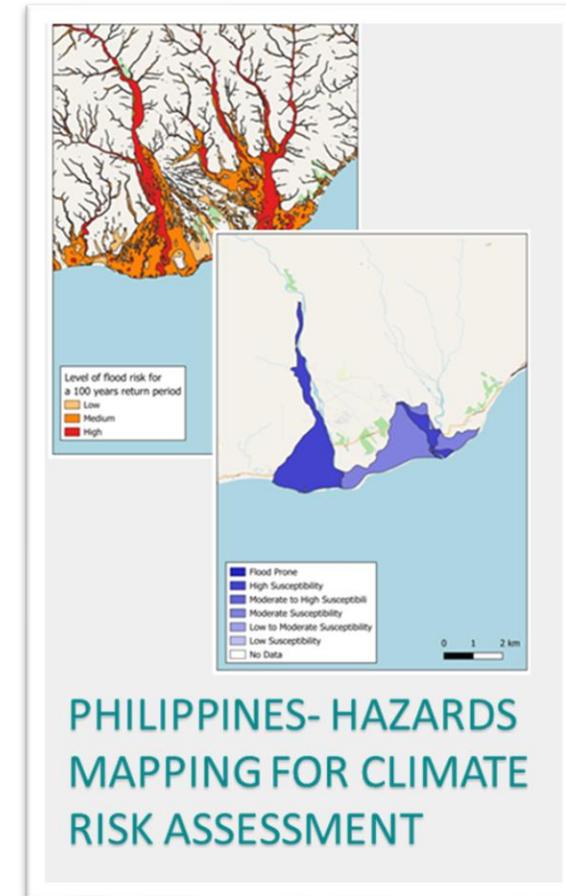
Why is a climate rationale important?

The process engages key stakeholders along a multiple phase co-production process



High level Results

- **Enhanced understanding** of climate risks and their effects within water sector
- **Strengthened Water and climate cooperation** ; cross sectoral coordination (Moz), developing Joint Sector Reviews (Sierra Leone)
- **Improve Policy coherence:** WASH inputs into NDC (Angola), Climate rationale informing the updated NDC (Uganda), updated WASH policies integrating climate (Nepal)
- **Climate data informing water planning-** GIS mapped hotspots (Cambodia, Vietnam, Philippines)



Example of action Plan - UW

Implement climate-informed early warning and emergency water-supply plans to predict salinity intrusion, support service providers during droughts and floods, and ensure safe water for displaced or vulnerable communities.

Develop and enforce climate-resilient technical design standards for water-supply infrastructure—addressing salinity intrusion, droughts, and floods—and introduce guidelines on sand mining, water-extraction permits, and efficient fittings.

Strengthen land-use planning and enforcement to protect upstream catchments, reduce deforestation, and maintain vegetation cover—supporting base flows during droughts and limiting sediment loads during floods.

Develop mandates for climate-resilient water safety plans and institutional disaster-management plans to strengthen operational response during droughts, floods, and sea-level rise and ensure emergency supply for displaced communities.

Reduce non-revenue water (NRW) through pressure control, district metered areas (DMAs), metering, and real-time monitoring to strengthen demand management

Conduct feasibility studies and climate-informed designs for resilient intake and storage infrastructure (e.g., salinity barriers, upstream reservoirs, alternative intakes) targeting high-risk areas.

Develop new water sources such as upstream reservoirs and promote watershed protection to enhance water retention, sustain flows, and reduce drought-related scarcity for service providers and dry-zone communities.

Establish national climate-relevant WASH data systems for hydrological, environmental, and service-performance data to support planning and early response to droughts, floods, salinity, and service disruptions.

Enforce land-use zoning and protection of sensitive areas, and establish inclusive catchment-level governance to reduce sedimentation, mitigate flood impacts, protect base flows, and safeguard water access for displaced or vulnerable households.

Raise community awareness on water conservation, safe water use during emergencies, and sustainable practices such as rainwater harvesting and reuse to reduce service pressure and prevent reliance on unsafe sources in drought and flood contexts.

Reflections & Limitations

- Climate risks can be defined by using publicly and globally data combined with expert consultation
- The process creates a platform for stakeholders' interactions, incorporating diverse sources of information, and can influence climate policies and improve policy coherence

BUT

- Climate projections, especially at the local level, often come with significant uncertainty- multiple scenarios
- Lack of comprehensive data on GHG emissions limits the capacity to scale mitigation opportunities
- Limited presence of climate experts in WASH sectoral discussions and limited capacity by WASH experts to interpret climate scenarios.

Thank You

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