Principles for selecting, designing, performing and communicating studies of human health issues involving border waters.

Health Professional Advisory Board

Prologue:

Canada and the United States created the International Joint Commission (IJC) because they recognized that each country is affected by the other's actions in lake and river systems along the border. The two countries cooperate to manage these waters wisely and to protect them for the benefit of today's citizens and future generations. The IJC has two main responsibilities: regulating shared water uses and investigating transboundary issues and recommending solutions. The IJC's recommendations and decisions take into account the needs of a wide range of water uses, including drinking water, commercial shipping, hydroelectric power generation, agriculture, industry, fishing, recreational boating and shoreline property.[1]

IJC's Health Professional Advisory Board (HPAB) was created to provide advice to the Commission and its Boards about current and emergent clinical and public health issues in the area of environmental health. Its directive is to provide expertise; identify and alert about emerging issues; review and synthesize knowledge and create reports to Commissioners, health providers and the public; make recommendations to the Commission, and collaborate with health professional associations and medical educational institutions on preventive education. The scope is focused on air or water quality in Great Lakes basin and other basins where the Commission has specific water quality responsibilities.[2]

There are many drivers of environmental change in boundary water basins, leading to hundreds of potential human health consequences when assessed comprehensively. [Appendix 1]. While some human health risks are relatively well recognized and characterized (like bacterial dysentery or mercury contamination of fish), others are often overlooked or poorly understood (like threats to indigenous subsistence cultures, endocrine disruptor chemicals, or the mental health consequences of flooding). Furthermore, past research has focused on acute illness and injury, typically in adults, while failing to address more complex issues such as effects on developing children or other vulnerable populations, relationships to chronic illness or reproductive dysfunction, and social and mental health consequences. Disparities in health conditions and outcomes are increasingly recognized as significant, persistent and ethically troubling. Thus the scope and complexity of environment-health interactions has led the HPAB to describe a set of criteria and principles to inform the selection and execution of reports and other deliverables to the Commission.

[1] Language taken directly from https://www.ijc.org/en/who/role, accessed July 1, 2017.
[2] Paraphrased or quoted directly from https://ijc.org/en/hpab/who/mandate, accessed July 1, 2017.

SELECTION PRIORITY: HPAB will be responsive to requests from the IJC and other Boards and stakeholders. However, given the scarcity of resources, HPAB will seek to give priority to projects aligned to the following concepts:

CONCEPT	DEFINITION	CONSIDERATION
Within scope of HPAB Directive	IJC's current directive to HPAB establishes scope boundaries for potential projects.	
New knowledge	New knowledge means significant new information has become available since the last high quality review or investigation conducted on a topic.	
Significant	Significant fulfills any of the following criteria: 1. that a meaningful boundary population might be affected; 2. that the conclusion might inform a meaningful policy or investment decision; or 3. that HPAB's product can add insight regarding one or more of the principles in this document that has not previously been explored.	
Research base	Research base means that a sufficient mass of observational and/or experimental research exists on the topic to warrant a project. When it is likely that sufficient research base is lacking, HPAB can still engage in the identification of knowledge gaps; describe considerations for research in the topic, or engage in pilot or feasibility studies.	HPAB is poorly equipped to perform large-scale data collection and analysis.
Leverages opportunity	Opportunity may include special expertise, capabilities or previous activities of HPAB or its members; relationships with other Boards and stakeholders; evolving data, technology or other resources available to the Board.	
Alert to disparities and inequities	Disparities refer to sub-populations (geographic, age, ethnic, racial, illness, gender, income etc.) experiencing disparate exposures or health outcomes. Inequities refer to systematic differences in the distribution of conditions required for good health. In general tribal/indigenous populations, racial and	Issues disparately affecting relatively small populations nevertheless warrant close attention both for ethical reasons and because such populations may signal risks to others (sentinels) and/or provide epidemiologic clues

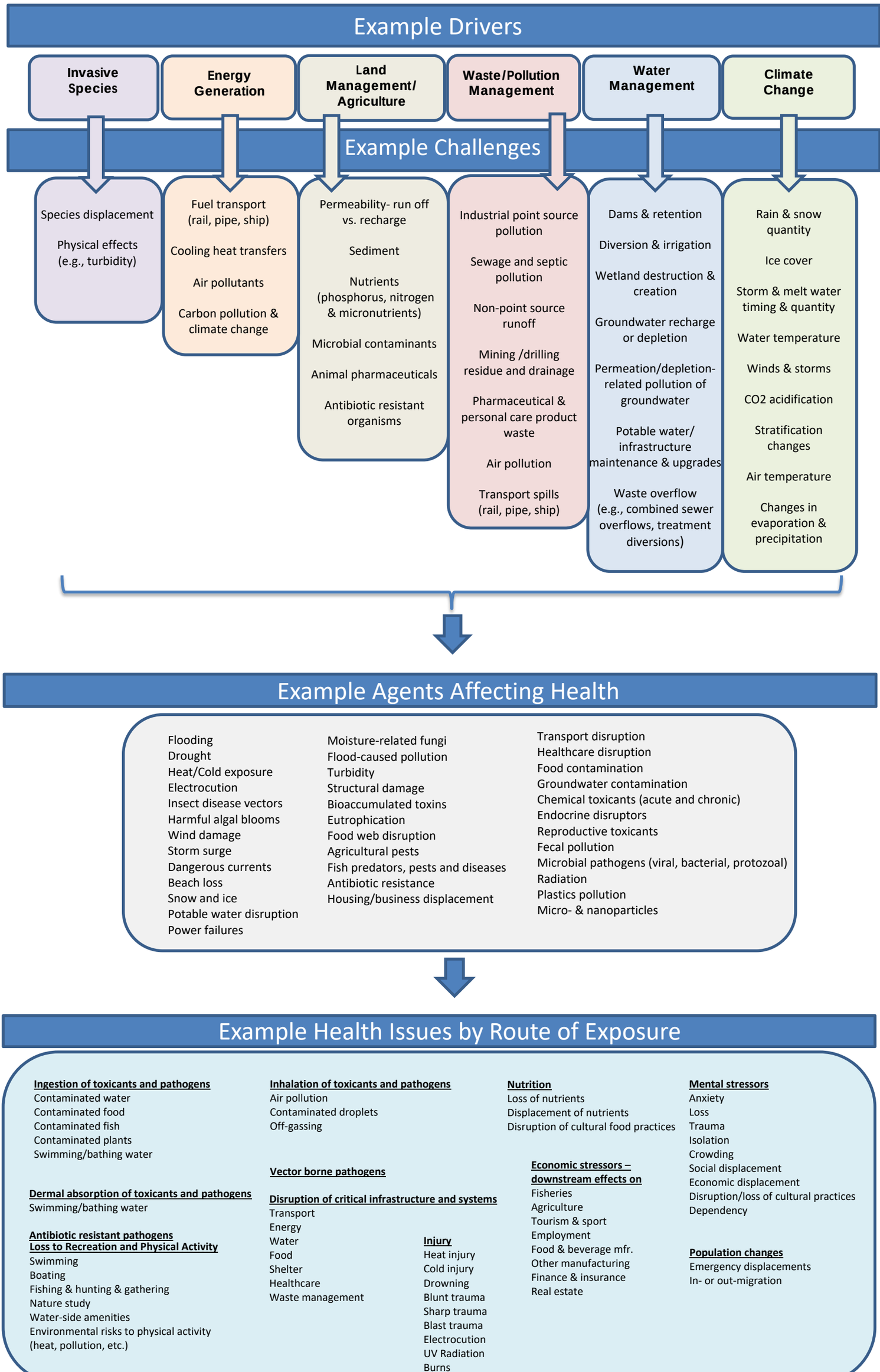
	ethnic minorities, and lower-income populations suffer inequities.	to pathogenic pathways.

PROJECT DESIGN, EXECUTION & COMMUNICATION: HPAB will seek to ensure that project leads and contractors explicitly address each of the following concepts as is appropriate and feasible:

CONCEPT	DEFINITION	CONSIDERATION
Vulnerable populations	Certain populations may be at greater risk of exposure or effects due to age, gender, culture, lifestyle, chronic illness, occupation or other factors.	Plausibly vulnerable populations should be identified and addressed to the extent practical, rather than being subsumed into population-wide averages of exposures, risks or effects.
Life stage perspective	Life stage perspective recognizes differential exposure risks and effects at different ages and stages of development (prenatal, infancy, youth, reproductive period, middle age and elder status) as well as different patterns of cumulative or long-term effects over time and between generations	Risks and effects at different developmental stages and chronic and cumulative effects should be addressed. Possible cumulative and intergenerational effects should be considered.
Disparities and inequities	(Defined under Prioritization Principles, above)	Sub-populations should be explicitly examined for disparate exposures and effects when possible and not subsumed into population-wide averages of exposures, risks or effects. Interactions of exposures or effects with inequities should be explicitly described.
Subsistence use, Native & Indigenous rights	Subsistence use refers to populations that make direct use of basin plants, animals or other resources (including greater use of local water) to meet basic needs on an	Those engaged in subsistence fishing, gathering, etc. may have increased or unusual exposures that should explicitly be

	ongoing basis. Native and indigenous populations may have specific rights and institutions as well as socioeconomic inequities that may affect risk exposures or policy solutions.	characterized and analyzed. Rights, institutions and inequities affecting native and indigenous peoples should be explicitly considered. Indigenous knowledge shall be sought and considered when appropriate.
Stakeholder engagement	Basin residents, recreational users, consumers of products (including water), businesses, governments and civil advocates for the environment and natural resources hold a stake in water-related human health issues and their solutions.	When appropriate, stakeholders should be identified and solicited to add their perspectives or insights to project design.
Precautionary Principal	When a condition, action or policy has a suspected risk of causing harm to the public or the environment, the absence of scientific consensus (that the action or policy is not harmful) it shall not lead to the assumption of no harm.	When a plausible risk exists, gaps in scientific information shall be acknowledged in a neutral fashion, such that the absence of evidence is not conflated with negative evidence.
Solution-oriented – prevention, adaptation & resilience	Board work explicitly seeks to protect the public by policies or other measures to prevent harm, and/or adaptive measures to mitigate harm, and/or measures to improve recovery if harm occurs.	Projects should be designed to identify preventive, adaptive and recovery-related recommendations, or to identify gaps in knowledge needed to do so
Ecological health perspectives	The ecological perspective seeks and accounts for interactions between land, air, surface and ground water, plant, animal and human activity in an interrelated web.. "One health" is a public health term reflecting the ecological	Indirect risks (e.g., through food web or ground /surface water interactions) will be explicitly sought and described. Large scale/long term events like climate change will inform projects.

	perspective, acknowledging relationships between human, animal and plant health and leveraging knowledge across these realms to describe environmental health risks.	Veterinary/wildlife and botanical/agricultural information and expertise will be examined for human health relevance.
Climate change	Climate change refers to anthropomorphic and natural factors leading toward long-term changes to weather patterns. Virtually every environmental challenge to boundary basins and subsequent health effects will be affected by projected changes in climate.	To the extent practical, projects will address if and how projections of climate and resulting ecological change will influence health outcomes. The roles of preventing, adapting and mitigating climate change should be considered in recommendations.
Sustainability	Sustainability means that the future viability of a natural or human system should not be sacrificed for short-term goals.	Tolerance for environmental change and the design of solutions should seek to preserve resources and capabilities needed for future generations.
Risk Communication	Risk communication accommodates psychological findings regarding the perception and response to risk by people and populations.	Descriptions of human health risks and of recommended solutions shall be performed to best enable and encourage responses appropriate to the level and immediacy of risk.


Example Drivers
Invasive Species
Energy Generation
Land Management/ Agriculture
Waste/Pollution Management
Water Management
Climate Change
Example Challenges
Species displacement
Physical effects (e.g., turbidity)
Fuel transport (rail, pipe, ship)
Cooling heat transfers
Air pollutants
Carbon pollution & climate change
Permeability- run off vs. recharge
Sediment
Nutrients (phosphorus, nitrogen & micronutrients)
Microbial contaminants
Animal pharmaceuticals
Antibiotic resistant organisms
Industrial point source pollution
Sewage and septic pollution
Non-point source runoff
Mining /drilling residue and drainage
Pharmaceutical & personal care product waste
Air pollution
Transport spills (rail, pipe, ship)
Dams & retention
Diversion & irrigation
Wetland destruction & creation
Groundwater recharge or depletion
Permeation/depletion-related pollution of groundwater
Potable water/ infrastructure maintenance & upgrades
Waste overflow (e.g., combined sewer overflows, treatment diversions)
Rain & snow quantity
Ice cover
Storm & melt water timing & quantity
Water temperature
Winds & storms
CO2 acidification
Stratification changes
Air temperature
Changes in evaporation & precipitation
Example Agents Affecting Health
Flooding
Drought
Heat/Cold exposure
Electrocution
Insect disease vectors
Harmful algal blooms
Wind damage
Storm surge
Dangerous currents
Beach loss
Snow and ice
Potable water disruption
Power failures
Moisture-related fungi
Flood-caused pollution
Turbidity
Structural damage
Bioaccumulated toxins
Eutrophication
Food web disruption
Agricultural pests
Fish predators, pests and diseases
Antibiotic resistance
Housing/business displacement
Transport disruption
Healthcare disruption
Food contamination
Groundwater contamination
Chemical toxicants (acute and chronic)
Endocrine disruptors
Reproductive toxicants
Fecal pollution
Microbial pathogens (viral, bacterial, protozoal)
Radiation
Plastics pollution
Micro- & nanoparticles
Example Health Issues by Route of Exposure
Ingestion of toxicants and pathogens
Contaminated water
Contaminated food
Contaminated fish
Contaminated plants
Swimming/bathing water
Dermal absorption of toxicants and pathogens
Swimming/bathing water
Antibiotic resistant pathogens
Loss to Recreation and Physical Activity
Swimming
Boating
Fishing & hunting & gathering
Nature study
Water-side amenities
Environmental risks to physical activity (heat, pollution, etc.)
Inhalation of toxicants and pathogens
Air pollution
Contaminated droplets
Off-gassing
Vector borne pathogens
Disruption of critical infrastructure and systems
Transport
Energy
Water
Food
Shelter
Healthcare
Waste management
Injury
Heat injury
Cold injury
Drowning
Blunt trauma
Sharp trauma
Blast trauma
Electrocution
UV Radiation
Burns
Nutrition
Loss of nutrients
Displacement of nutrients
Disruption of cultural food practices
Economic stressors – downstream effects on
Fisheries
Agriculture
Tourism & sport
Employment
Food & beverage mfr.
Other manufacturing
Finance & insurance
Real estate
Mental stressors
Anxiety
Loss
Trauma
Isolation
Crowding
Social displacement
Economic displacement
Disruption/loss of cultural practices
Dependency
Population changes
Emergency displacements
In- or out-migration