The Environment, Community and Health Observatory (ECHO) Network

Outcomes, Learning and Pathways Forward

2017-2021

Contents

Title photo: *ECHO Network members at the launch of ECHO in 2017, standing at the confluence of the Nechako and Fraser Rivers, on the unceded and traditional territories of the Lheidli T'enneh people in Prince George*

Suggested citation: ECHO Network (April 2022). The Environment, Community and Health Observatory (ECHO) Network: Outcomes, Learning and Pathways Forward 2017-2021. Online at: https://www.echonetwork-reseauecho.ca.

Warm acknowledgements to ECHO Partners:

1 Intent

"We have to take care of earth because the earth takes care of us".

- Mi'kmaq Elder Donna Augustine (ECHO 2019 Annual Meeting)

In May 2017, a five-year initiative called ECHO (Environment, Community and Health Observatory) was launched on the unceded and traditional territories of the Lheidli T'enneh, now called Prince George, Canada. ECHO aims to strengthen intersectoral capacity to understand and respond to the health impacts of 'resource extraction', and especially impacts felt by rural, remote and Indigenous communities. Resource extraction refers to human activity such as mining, agriculture, fishing and forestry.

This evaluative overview of ECHO was prepared in late 2021, to:

Share outcomes and learning from ECHO	**Guide ECHO's final phase in 2022**	**Inform others seeking to work in more integrative ways**

The report presents ECHO's context, purpose, journey, outcomes and learning at the meta-level. It concludes with pathways for integrative practitioners to explore, based on the ECHO experience.

The focus is on the centralised work of ECHO as an intersectoral, complex collaboration that spans four regions in Canada (Alberta, Northern British Columbia, British Columbia and New Brunswick), and has Oceania connections with collaborators in Australia, Hawai'i, New Zealand and Fiji. Outcomes and learning from ECHO's work on the ground through its four regional cases[1] and emerging cases are shared at https://www.echonetwork-reseauecho.ca/resources. A summary of this report is also on this site and further ECHO publications are forthcoming in 2022 and 2023.

---

[1] See https://www.echonetwork-reseauecho.ca/regional-cases-2.

2 Approach

This report was developed through the following process.

Method	Description
ECHO documentation review	A review of over 60 ECHO documents, including journal articles, policy briefs, annual ECHO network meeting summaries, ECHO presentations, workshop summaries and evaluation findings (see References).
ECHO workshop and interviews	A workshop with ECHO's Operations Team and interviews with ECHO Lead Researcher Margot Parkes and ECHO's Research Manager Diana Kutzner.
ECHO Network Knowledge Exchange Series November 2021	Insights were drawn from five online ECHO knowledge exchange sessions held in late 2021, focused respectively on healing indicators, ECHO reflections in art, health in watersheds, ECHO and youth, and guidance for tackling complexity in socioecological systems.
Draft report review	Reviews of report drafts were undertaken by ECHO's Learning and Impact and Research Leads teams. These two teams include core ECHO team members such as Lead Researchers, Regional Case partners and Collaborating Knowledge Exchange Partners linked to ECHO. See Figure Three for a description of the ECHO Network's learning community.

ECHO Annual General Meeting 2018

3 ECHO Context

"Take, take, take, where is the reciprocality?"

- Lheidli T'enneh Elder Darlene McIntosh

"...the [ECHO] Network is embroiled within the colonial contexts that reproduce the conditions for extractive endeavours".

- Sloan Morgan et al., 2020

Resource extraction[2] is the removal of minerals, metals or fossil fuels from the earth's crust (Brisbois et al 2019). The Canadian economy is tightly coupled with resource extraction, including mining, oil and gas, forestry, fisheries, agriculture, aquaculture, renewable energy and nature-based tourism (Parkes et al 2019). Cumulative impacts of resource extraction tend to be addressed in isolation and be poorly understood, especially as they multiply and change over time and space (Brisbois et al 2021).

The work of ECHO has unfolded in times of deep challenge and disturbance for ecosystems, communities and health in Canada. Climate change is landing through floods, wildfires, mudslides, extreme temperatures and weather events, alongside the COVID-19 pandemic. There is ongoing violence and injustice against Indigenous peoples, systemic racism, poverty, an opioid crisis and gender inequalities.

A recent ECHO article (Sloan Morgan et al, 2020) explores how the settler colonial context permeates resource extraction in Canada. It notes that Canada's government continuously upholds corporate interests over the long-term health and wellbeing of local communities, behind a discourse of 'national interest', even when First Nations interests have a Supreme Court of Canada decision that upholds their authority over territories. Western law is used to criminalise Indigenous and other people trying to protect land and water for future generations. The article notes scientific communities stated concern over environment, community and health (E-C-H) impacts of resource extraction and repeated condemnation of human rights violations against Indigenous peoples. It asks:

---

[2] Sometimes referred to as 'resource development'; the term 'resource extraction' is used here.
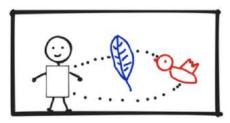
"...why do extractive projects in Canada continue to violate legal obligations? Why do we repeatedly witness disregard for human rights and Indigenous rights internal to Canada? Who is accountable for the long-term and cumulative effects of these projects? What can be made of the violence inflicted to push project approvals through when viewed across sectors and perspectives, including those that consider the environmental, social, and health impacts that may result?"

- Sloan Morgan et al., 2020

The ECHO Network is acutely aware that across Canada, resource extraction often occurs in rural, remote, northern landscapes, and on traditional and often unceded Indigenous territories. It is also clear that current systems and processes enable this:

"Multiple actors, sectors, and governance structures converge through settler jurisdiction to 'make way' for extractive projects"

- Sloan Morgan et al., 2020

I wish that humans were able to really grasp natural environment as an integrative part of what defines health.

Source: ECHO 'Comic Jam' contribution

This creates a tension for ECHO in wanting to fuel action for social change, while being embedded in these very same sectors, settler laws, world views and governance structures. Better understanding this situation does not of itself change it; and neither does abundant evidence of the harms caused by resource extraction. This is a central dilemma for ECHO: how to create change while being nested within the systems and world views perpetuating the harms?
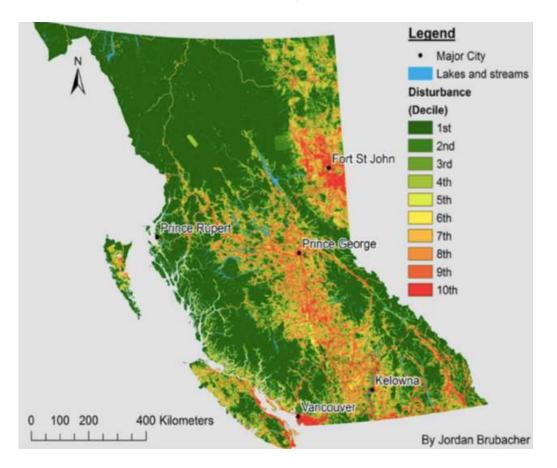
"The challenge here is we can have all the data, evidence and knowledge translation in the world, but the political appetite doesn't want to see it".

- Regional Case Conversations, 2019

Urgent drivers for more integrated, intersectoral approaches to preventing and mitigating health impacts of resource extraction include (Parkes et al 2019, Brisbois et al 2021):

- Failure to protect the web of life - biodiversity, species and the health of ecosystems, including inadequate policy, federal and provincial legislation.
- Failure to protect human health and growing social inequities.

- Canada's poor and worsening record on health in relation to the environment[3].

- Inability of current assessment frameworks to express an integrated understanding of social and ecological determinants of health, and E-C-H connections.

- Urgent calls for Indigenous-led impact assessment and increased Indigenous representation and decision making in impact assessment processes.

- Predominance of commercial and corporate power in the resource extractive industries, including multinational and global corporations.

- The desire to support the growing Indigenous and community movements to protect land, water and people from harmful effects of resource extraction and other human activity[4] .

An ECHO created map of cumulative anthropogenic disturbance in British Columbia.

---

[3] See for example https://www.nationalobserver.com/2019/11/11/news/canada-gets-poor-marks-latest-climate-report-card

[4] See for example https://www.cbc.ca/news/canada/british-columbia/wetsuweten-nation-eviction-coastal-gaslink-1.6249030 and Indigenous Climate Action.

4 About ECHO

"Sectors separate environment, community and health but people live them all at once".

- ECHO 2019 Annual Meeting

ECHO is a learning network that develops tools and processes to illuminate the combined environmental, community and health impacts of resource extraction. ECHO seeks to counter the environment, community and health (E-C-H) 'integration gap' - the tendency to separate issues, impacts, knowledge, skills and sectors. ECHO sought to address the integration gap in existing public health observatories, by focusing on integrative tools and processes, and supporting intersectoral action to better understand and respond to the cumulative health impacts of resource extraction.

Public health observatories with an overt focus on the E-C-H integration gap can offer a way to take a more joined-up approach to intertwined issues and complex situations, creating opportunities to connect data, information, experts, sectors, thinking and practices. This requires resourcing and capacities to work collaboratively with diverse people, vertically across human social and political systems, horizontally across space, systems and species and longitudinally over time.

ECHO was initiated with these two objectives[5]:

1. Develop, test and share tools, processes and intersectoral strategies to improve integrative understanding and responses to the health impacts of resource extraction.

2. Contribute evidence and recommendations to foster integrative understanding and responses to the complex dynamics of resource extraction and health.

---

[5] Drawn from the original ECHO proposal 2016 and ECHO's 2020 Theory of Change.

ECHO was designed to cultivate mindsets, relationships and practices to:

- Recognise and value Indigenous and local community knowledge.
- Design, test and share integrative data collection, tools and processes.
- Cross boundaries among sectors, jurisdictions and disciplines.
- Design and support intersectoral responses to long-term health impacts of resource extraction.
- Enhance youth and community engagement in these processes.
- Strengthen capacity for integrative work among a new cadre of researchers, practitioners and community members.
- Showcase the potential of observatories to support intersectoral decision-making.

ECHO aims to be Indigenous-informed. Indigenous here refers inclusively to the First Nations, Métis, and Inuit peoples of Canada, and the term First Nation(s) to denote specific First Nations within Canada. The ECHO Network includes Indigenous team members as research-leads and research partners, working alongside non-Indigenous team members who range from being longstanding allies and collaborators in decolonizing approaches, to those with minimal experience of working with Indigenous peoples.

"[The desire to be Indigenous-informed] challenges all team members and regional cases to be actively informed by, learn from, and engage with Indigenous and settler histories, dynamics, and contemporary processes that are unfolding in the lands and territories they work in".

- Parkes et al 2019

ECHO Team members welcomed to Saik'uz Territory, in 2017

The University of Northern British Columbia's (UNBC) Prince George campus is home base for ECHO, situated on the unceded territories of the Lheidli T'enneh. Cross-ECHO governance is held by a Steering Committee and an Operations Team oversees cross-ECHO teams workstrands.

Figure One: Cross ECHO Activity and Teams

CROSS ECHO ACTIVITY

Knowledge exchange and transfer[6]

Integrative tools and processes[7]

Network connections and collaborations

Taking notice for intersectoral action

CROSS ECHO TEAMS[8]

Equity, diversity, inclusion[9]

Integrated impact assessment

Geospatial tools

Watersheds

Trainee and capacity strengthening

Learning and impact (evaluation)

Youth engagement

Research design

---

[6] See https://www.echonetwork-reseauecho.ca/resources to access ECHO publications.

[7] See https://www.echonetwork-reseauecho.ca/tools-and-processes and Section 7 for an overview of these integrative tools and processes.

[8] Each team includes members from across the learning community, generally involving multiple regional cases, roles (researchers and partners), career stages and orientations.

[9] This includes Indigenous self-determination and leadership, gender based plus analysis and an equity, diversity and inclusion lens across the work of ECHO.

ECHO work is grounded locally and regionally in four regional cases[10] across Canada, which provide testing grounds for integrative tools and processes. Each case involves a research partner and each began their engagement in the Network with an established focus and ECHO tools orientation.

Figure Two: ECHO Research partners and areas of focus

Research partner	Northern Health Authority, Northern British Columbia	First Nations Health Authority, British Columbia	Battle River Watershed Alliance	New Brunswick Environmental Network
Regional case focus	Community health and equity	Indigenous health	Health of ecosystems, wildlife, watersheds	Child health Climate and health
Initial tools focus	Integrative impact assessment tools	Digital geospatial tools	Indicator frameworks	Arts-based and narrative tools

ECHO remained open to emerging cases who wanted to collaborate with ECHO and be part of its Network. ECHO issues resonate across the globe, and international learning, collaboration and exchange opportunities are important for ECHO. Two 'emerging cases' have developed[11]:

1. ECHO maintains active connections with the Oceania region (Aotearoa New Zealand, Hawai'i, Australia and Fiji). This collaboration has supported international exchanges, knowledge sharing and ongoing peer support.

2. The Lake Superior Living Labs Network in Northern Ontario is a platform to connect academics and community groups to collaborate across the Lake Superior watershed, see https://livinglabs.lakeheadu.ca/. It has many parallels with ECHO and a productive relationship has formed.

Involving non-academic researchers such as health practitioners, Indigenous leaders and community organisations as equal partners in the research process is core to the integrative approach of ECHO. It also helps to keep the focus on the real-world use of knowledge generated.

The ECHO Network's learning community includes university researchers, research staff and trainees (from undergraduate to post-doctoral students) and health and community partners. Network members sign a consent form agreeing to engage in the learning community of the ECHO Network. Through interactions among its learning community, ECHO seeks to mentor and equip regional case partners and knowledge
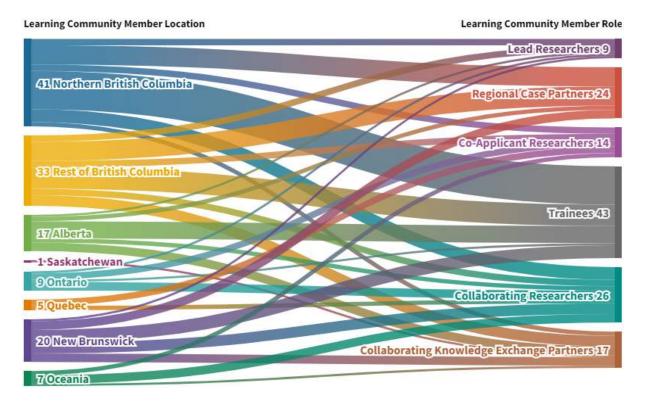
---

[10] See https://www.echonetwork-reseauecho.ca/regional-cases-2 for background on the regional cases.

[11] See https://www.echonetwork-reseauecho.ca/regional-cases-1.

exchange partners as well as researchers and trainees, to engage with the cumulative impacts of resource extraction (Parkes et al 2019).

Figure Three shows the location and roles of the ECHO Network's 133 members between 2017 and 2021.
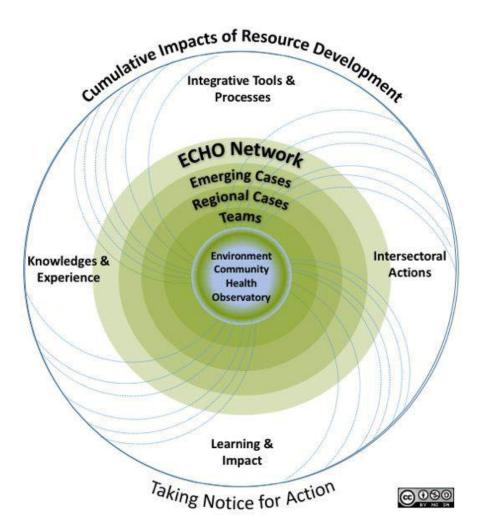
Figure Three: The ECHO Network Learning Community (2017- 2021): Location and roles of Learning Community members

Between 2017 and 2021, the ECHO Network engaged 133 Learning Community members from across Canada and Oceania (New Zealand, Australia Hawai'i and Fiji). Although some Learning Community Members have changed roles since the ECHO Network began, they are included here in relation to their main role over the past five years.

ECHO's intersectoral dynamic is hardwired into its funding structure, with half of ECHO's $2M funding over five years distributed to the four regional cases (~$50k each per year) via the universities involved: University of Northern British Columbia (ECHO's core fund holder), Simon Fraser University, University of Alberta (until 2021), and Université de Moncton, each working in context-specific ways with regional case partners. Cross-ECHO work was fueled by regional case insights and supported directly from a relatively small budget of around $200k annually. This covers the ECHO Research Manager role, annual ECHO gathering costs, the ECHO website, support for research trainees, communications and the work of the cross-ECHO teams, including evaluation and learning activities.

Figure Four depicts ECHO's structure, with its cross-ECHO observatory role in the centre, surrounded by cross-ECHO teams and its regional and emerging cases, which together form the ECHO Network (Parkes et al 2019).

Figure Four: A nested, emerging Environment, Community, Health Observatory Network

5 ECHO Journey

ECHO's research design was structured around four connected phases (ECHO proposal, 2016).

Figure Five: ECHO research design

Research component	Objectives
Scoping and establishment (Year 1)	• Review relevant knowledge, tools and processes • Establish ECHO • Identify priorities and opportunities
Tools, processes and learning consolidation (Years 1-5)	• Test and share integrative tools and processes that make environment, community and health (E-C-H) connections • Share insights from regional cases and across ECHO to support intersectoral action
Regional trials of intersectoral actions (Years 2-4)	• Test and share learning from regional trials of intersectoral actions, utilising ECHO tools and processes
Evaluation, synthesis and learning (Years 1-5)	• Evaluate and learn at regional and cross ECHO levels, to inform thinking, policy and action

In line with this design, broad phases in the evolution of the ECHO Network have been:

1. Taking notice of integrative approaches to combined environment, community and health impacts of resource extraction across the Network (2017/18), utilising the 'five ways to wellbeing'[12] framework as a lens, noting the relevance of opportunities to 'connect, be active, take notice, keep learning, and give' to individual wellbeing, as well as working in partnership with others (Thompson & Aked, 2011).

2. Trialling and refining integrative and intersectoral tools and processes within the regional cases (2018 on). The experiences and challenges with these initial phases of integrative work (Parkes et al, 2019), required naming the 'elephants in the room' for ECHO, including issues around equity,

---

[12] See https://neweconomics.org/2008/10/five-ways-to-wellbeing, and Thompson, S. & Aked, J. (2011).

diversity and inclusion within ECHO itself, and complicity with colonial structures that generate ongoing harms from resource extraction[13] (2018 on).

3. The midway point of the five-year ECHO Network journey (2019/20) underscored the need and desire to move from knowledge to action across the Network, requiring clarification of what impact and value from ECHO would look like, and demonstrating action within ECHO and beyond.

4. Sharing findings and orienting to what next for ECHO (2021 onwards).

ECHO Network leaders describe the midway point in the project (2019/2020) as a deliberate shift from mostly isolated regional case work towards increased cross-ECHO exchange and action. This action involved engaging communities and agencies in regional tools, promoting use of these tools, writing peer-reviewed articles and policy briefs, and creating ECHO knowledge products.

The impact of COVID-19 on ECHO was described as 'massive', as health partners capacity was absorbed into responding to the pandemic, interactions and plans were interrupted, and capacity within ECHO generally reduced. This quote was part of an ECHO member's contribution to the 2021 E-C-H Expressions in Art activity, titled "World According to ECHO - Glimpses of environment, community, and health connections in the COVID era" (Skinner, 2021).

ECHO brings people together across places and sectors to connect, share, learn and plan. Engaging across a geographically dispersed team, including regional case partner-links with rural, remote and Indigenous communities, became especially challenging in a COVID-19 era. Planned face to face and convening work to test and ground tools and processes in regional case communities in 2020 and 2021 was severely disrupted.

> *"Covid turned public health [organisations] back to its bread and butter, and ECHO issues get swept to the side"*
>
> *- ECHO Network member*

The pandemic underscored digital equity issues, with uneven access to the Internet and varied capacities to use online technologies. Intentions to convene in-person regionally and across the Network were replaced by online engagement that was only an option for some, and can be less appealing for those whose entire working lives moved online, alongside new personal and professional demands (especially for health partners dealing with a pandemic).

The 2020 ECHO Network Annual Meeting moved online, and an intended ECHO-supported 'Land, Health and Healing Gathering' June 2020 was postponed, leading to a series of online 'seasonal touchpoints' in Summer, Fall and Spring (2021-2022), and a delayed Gathering in June 2021.

---

[13] See for example Parkes et al 2019 and Sloan Morgan et al 2020.

This collaboration was co-designed by Lheidli T'enneh and UNBC collaborators in Prince George and was co-hosted via a hybrid format (virtual and in-person). The June 2021 event focused on creating opportunities for knowledge exchange across cultures, disciplines and contexts, and profiled integrative and Indigenous approaches to Land, Health and Healing. Over 140 people participated, across Canada and internationally, and the gathering was supported by multiple collaborators. Videos from the Land, Health and Healing presentations have been edited and will be available via the ECHO website in mid-2022.

2018 ECHO photo voice image

6 ECHO Outputs
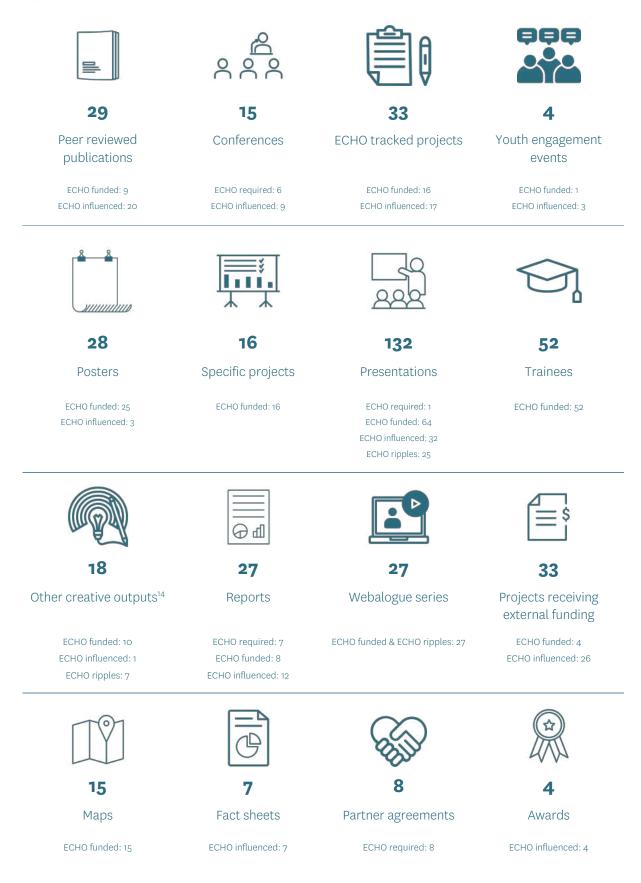
ECHO has maintained a 'CV' through its journey which captures tangible ECHO outputs across four categories:

ECHO required	Foundational activity such as governance, work teams, annual and contract meetings, funding agreements, ethics and evaluation activities
ECHO funded	Core ECHO paid staff activity, paid regional case activity, ECHO publications, presentations, workshops, evaluation and learning
ECHO influenced	Projects running alongside and intersecting with ECHO, plus tools, processes and other work that benefits over time from ECHO
ECHO ripples	Collaboration between two or more ECHO Network members, projects and ideas linked but separate to ECHO, people moving on from ECHO and online resources

2018 ECHO annual meeting

Figure Six: ECHO outputs, accurate to end December 2021

29

Peer reviewed
publications

ECHO funded: 9
ECHO influenced: 20

15

Conferences

ECHO required: 6
ECHO influenced: 9

33

ECHO tracked projects

ECHO funded: 16
ECHO influenced: 17

4

Youth engagement
events

ECHO funded: 1
ECHO influenced: 3

28

Posters

ECHO funded: 25
ECHO influenced: 3

16

Specific projects

ECHO funded: 16

132

Presentations

ECHO required: 1
ECHO funded: 64
ECHO influenced: 32
ECHO ripples: 25

52

Trainees

ECHO funded: 52

18

Other creative outputs[14]

ECHO funded: 10
ECHO influenced: 1
ECHO ripples: 7

27

Reports

ECHO required: 7
ECHO funded: 8
ECHO influenced: 12

27

Webalogue series

ECHO funded & ECHO ripples: 27

33

Projects receiving
external funding

ECHO funded: 4
ECHO influenced: 26

15

Maps

ECHO funded: 15

7

Fact sheets

ECHO influenced: 7

8

Partner agreements

ECHO required: 8

4

Awards

ECHO influenced: 4

---

[14] Including graphic recordings (6) and blogs (7) about ECHO.

ECHO teaching moments (top two photos) and 2018 ECHO Annual Meeting at bottom.

7 ECHO Tools and Processes

"The challenge of 'making the invisible, visible' is such a powerful, important theme for our ECHO Network".

- Chris Buse, ECHO Pulse Series

Resource extraction involves multiple land uses and industries. It creates cumulative impacts over space and time and health impacts for all of life (animals, plants, land and soil, air and water), that are not the responsibility of any one sector to address. Cumulative impacts refer to accumulating pressures that leave lasting consequences for all species, communities and the broader physical environment (adapted from Gillingham et al 2016).

ECHO Network members have written extensively about how to develop more integrated assessment of the impacts of resource extraction, including key indicators of an inclusive, diversity-focused, gender-sensitive impact assessment process (Hoogeveen et al 2021 and Hoogeveen et al 2020) and strategic regional impact assessment (Buse et al 2020). ECHO has also contributed to a recently released major report called The Health of Canadians in a Changing Climate (Berry and Schnitter Eds 2022[15]), via input to a chapter on climate change and health equity.

There are simultaneous needs to demonstrate impacts and issues at watershed and national levels, to compare and contrast across regions, and for intensely local indicators and data. While a recently enacted Impact Assessment Act at Federal level moves things forward, there is still a concerning lag between resource extraction activities and understanding of their effects.

A core goal of ECHO is to develop, test and share integrative tools and processes. Importantly, tools require processes that can test, socialise and embed their use - tools without these processes are ineffective. Tools and processes developed via ECHO are shared below, ending with a summary table sharing six key types of tools and processes that have been developed and utilised by the ECHO Network. These approaches to addressing the identified E-C-H integration gap are profiled on the ECHO Website and some are described in videos on the ECHO YouTube Channel.

---

[15] See https://changingclimate.ca/health-in-a-changing-climate/.

Arts-based and narrative methods

"Art is a mechanism to disturb some of the disconnected ways we think about these issues. Art plays a vital but unrealised role in working to change and mitigate violence against environments, communities and health".

- Sarah de Leeuw, Director Health Arts Research Centre

Utilising arts-based and narrative approaches to explore and communicate E-C-H issues was a Network-wide interest and was key to ECHO from the outset, with the Health Arts Research Centre[16] a co-applicant in the ECHO grant application. Arts and narrative-based methods such as photovoice, graphic recordings, comic jams[17] and digital stories provide rich ways to explore E-C-H issues. ECHO journal articles discuss storytelling as counternarratives to support thinking about blue and green spaces in different ways (Gislason et al 2018)[18], and the risks and benefits of storytelling and visual arts when looking at the health dynamics of Indigenous and settler peoples in Northern British Columbia (de Leeuw et al 2017)[19].

Arts-based and narrative methods prompt different conversations, emotional connections, team strengthening and stretching. They can also communicate complexity, offer creative ways to grapple with issues and can generate new ways of seeing. See https://www.echonetwork-reseauecho.ca/arts-based-narrative-approaches for ECHO examples, including a digital story created by ECHO Network Trainees of E-C-H integration, based on ECHO member submissions to an Expressions in Art activity in 2020. See here to view the "The World According to ECHO - Glimpses of environment, community, and health connections in the COVID era" Padlet.

Capacity strengthening

"The E-C-H lens has been instrumental...in order to avoid doing extractive and reductionist research".

- Trainee

An explicit aim for ECHO is to grow capacities for thinking and acting in integrative ways, to better address entrenched challenges. Capacity strengthening has been a strong focus of the ECHO Network overall, through its gatherings, tools and process development, projects, publications and presentations. ECHO

---

[16] https://healtharts.ca/.

[17] See http://healtharts.ca/comic-jams-intersectoral-research-and-responses-to-the-impacts-of-resource-extraction/.

[18] See https://pubmed.ncbi.nlm.nih.gov/30321859/.

[19] See https://onlinelibrary.wiley.com/doi/full/10.1111/cag.12337.

has mentored a new cadre of researchers, practitioners and community members to engage with the diverse implications of the cumulative impacts of resource extraction.

ECHO examples and case studies directly inform CoPEH-Canada (Community of Practice in Ecosystem Approaches to Health)[20] training courses, and ECHO Network members participate in these courses, including trainees. The CoPEH-Canada Summer Schools are linked to formal courses across three universities: University of Northern British Columbia's Field School in Human Ecology, the University of Guelph and the University of Quebec and Montreal.

A late 2021 reflective process captured research trainee experiences of being part of the ECHO Network. It found that capacity was strengthened for these trainees in terms of being able to understand and communicate E-C-H issues; navigate dynamics associated with collaboration; strengthen critical thinking and build lasting connections. Additional support was desired around having clear direction for their work and language inclusivity, and especially French translation.

Geospatial Tools: Maps and Portals

Geospatial tools provide a way to visually map what is happening in a locality. ECHO has used maps and other geospatial tools to profile and share information about cumulative environmental, community and health impacts for ECHO Member and partner groups. This includes refinement of anthropogenic disturbance maps (Brubacher et al, 2018), linkages with the expanded BC LEO Network, developed by FNHA (https://www.fnha.ca/what-we-do/environmental-health/bc-leo-network) and partnering to develop the Nechako Watershed Portal and ECHO Network Portal. To introduce new team members to the portal, ECHO has developed a YouTube channel:
https://www.youtube.com/channel/UCITvn4za7JkSVrdcC1FNnvg/videos

This portal tool was initially developed with First Nations and other groups in British Columbia and is being adapted to the ECHO Network's need for a secure archive that can store and share complex data related to environment, community and health issues. Established users rely on the portal to host monitoring data, submit content to the Portal and include any digital file format (documents, videos, pictures, hyperlinks), with the ability to restrict access to sensitive data, and to search information others have shared for viewing. The software is Open Source so all improvements that are made to the Portal are shared amongst all of those that have access to the portal. It is constantly being upgraded and improved.

---

[20] See https://copeh-canada.org/en/key-areas/training-and-capacity-building/15-champs-d-action/245-copeh-canada-course.html.

Integrated assessment tools

Responding to the need for more integrated assessment of the impacts of resource extraction has been a key focus for ECHO Members (see Brisbois et al 2021, Buse et al 2020, Hoogeveen et al 2021 and Hoogeveen et al 2020). Related tools and processes explored via ECHO in response to this need include:

- **Risk and Benefits Calculator**
  ECHO's New Brunswick case has developed a Risks and Benefits Calculator[18] to support anyone to assess the impacts of resource extraction and development in their local area:
  https://nben.ca/en/risksand-benefits

- **Integrated regional profile guide**
  ECHO has contributed to the development of an Integrative Regional Profile Guide in partnership with the Cumulative Impacts Research Consortium[17] based at the University of Northern British Columbia (Wilson et al 2018). This is a tool to communicate and foster discussion related to cumulative impacts that can: help make connections between seemingly disparate regional characteristics (i.e. house prices and self-reported health status); be adapted to inform a variety of land-use decision-making and planning processes that occur at various jurisdictional scales; provide baseline information and trajectories of change for a range of positive and negative impacts of resource development; and surface gaps in data.

- **Enviroscreen pilots in the Canadian context**
  The ECHO Network has been adapting an established geospatial screening and assessment tool, the CalEnviroScreen https://oehha.ca.gov/calenviroscreen, to support interactions and exchange across the Network. Initial pilots in the BC context were developed in partnership with the Combined Impacts Research Consortium, the Northern Health Authority, Office of Health & Resource Development, and the Centre for Environmental Assessment Research. This has led to several Canadian pilots of innovative, integrative, and geospatial cumulative impacts screening tools that merge environmental, community and health data, that were profiled during the 2021 ECHO Pulse series and have led to numerous interactions since then (Buse et al, 2022).

Healing indicators

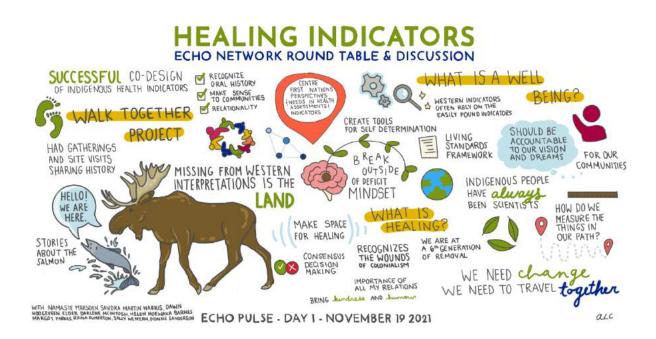*"We need to flip around Western as 'normal' and Indigenous as 'other'".*

- Helen Moewaka-Barnes, ECHO Oceania Collaborator

Through ECHO's partnership with the First Nations Health Authority (FNHA) and Simon Fraser University (SFU) in British Columbia, ECHO is co-funding and supporting important work developing healing indicators as vehicles for Indigenous self-determination, leadership, better E-C-H outcomes and system change.

Healing indicators are co-designed using decolonial 'two-eyed seeing': with one eye informed by Indigenous ways of knowing and the other by western science. This process looks to find leverage in policy and regulatory frameworks for Indigenous values and knowledge. Healing indicators shift the common deficit focus of many indicators to land as a source of health and healing and are centred on Indigenous peoples' collective strengths. ECHO member Dawn Hoogeveen[21] achieved two academic funding awards to pursue this work, in conjunction with FNHA and SFU. It is also closely linked to the First Nations Population Health and Wellness Agenda[22].

In Alberta's Battle River and Sounding Creek Watersheds, a Health in the Watershed Atlas has been developed involving the best available information in terms of water, economy and land, personal wellbeing, weather and climate, people and community, ecosystem and biodiversity. Challenges with all of these indicator sets are identified and communicated.

From the available indicator data, fact sheets are constructed through a multi-stage process involving data collection and collaboration with data providers, data analysis and reporting of results. Fact sheets are designed to provide a succinct entry into the state of targeted health indicators in the Battle River Watershed and Alberta as a whole. This work is being led by the Alberta Centre for Sustainable Rural Communities in collaboration with the University of Lethbridge (see www.acsrc.ca) for 2022 release.

---

[21] For more on Dawn's work: https://www.sfu.ca/fhs/news-events/news/2021/mshrbc-awards-fall-2021.html and https://www.msfhr.org/1/award/healing-indicators-research-in-indigenous-health-impact-assessment-and-self-determination.

[22] See https://www.fnha.ca/Documents/FNHA-PHO-First-Nations-Population-Health-and-Wellness-Agenda.pdf and https://jps.library.utoronto.ca/index.php/ijih/article/view/33206.

Youth engagement

"We are capturing with photos what we are doing to our planet; we learned that as humans we can negatively impact the planet but we also have the power to make positive change".

- Year 8 Student

Child and youth engagement in ECHO occurs through its regional cases, ECHO university students and trainees, and relationships formed with schools and communities through ECHO-related projects. Two examples are:

1. School-aged student involvement in New Brunswick Environmental Network's environmental education collaborations with Le Groupe de développement durable du Pays de Cocagne/Sustainable Development Group[23]

2. The Waterways Mentor Programme in SD91 in Northern British Columbia, where Grade 8-12 students mentor younger students about waterways.

The Waterways Mentor program has been linked more recently to the UNBC-SD91 Koh-Learning in our Watersheds Project[24], which is a major vehicle for youth engagement in ECHO. Initiated in 2017, this collaboration has continued through youth participation from SD91 in annual ECHO meetings in Camrose, Alberta in 2018, and in New Brunswick in 2019.

Much youth engagement within ECHO has occurred via school-based projects where children and young people connect with nature and collect data that informs decision making on watersheds, creating new opportunities for collaboration focused on land, water and climate change in British Columbia and Alberta.

Youth engagement in ECHO has explored social media[25], digital storytelling and youth channels such as Tik Tok to share work around intergenerational climate justice, young people and mental health. Tik Tok condenses information to a maximum of three minutes, and supports communicating data and science differently, to wide audiences.

---

[23] See https://ecopaysdecocagne.ca/en/.

[24] See https://www2.unbc.ca/integrated-watershed-research-group/koh-learning-our-watersheds-transforming-education-connecting-students-communities-and-waterways.

[25] ECHO YouTube Channel https://www.youtube.com/channel/UCITvn4za7JkSVrdcC1FNnvg and Tik Tok account: @echo_ruralab.

Summary of tools and processes	How they show up in ECHO
Arts based and narrative methods	Arts and narrative based methods such as photovoice, graphic recordings, comic jams and digital stories provide rich ways to explore E-C-H issues, that can be integrated into face to face and virtual exchanges (see for example Martin Harris 2020). Gislason et al (2018) and de Leeuw et al (2017) explore these ideas further.
Capacity strengthening for integrative work	Capacity strengthening occurs through ECHO gatherings, tools and process development, projects, publications and presentations. ECHO has mentored researchers, knowledge exchange partners and community members to engage with the cumulative impacts of resource extraction. ECHO has also strengthened existing education and training programs to address these themes, including support for (and ECHO Team participation in) the CoPEH-Canada annual, multi-site field course on Ecosystem Approaches to Health.
Geospatial Tools	ECHO has used maps and geospatial tools to profile and share information about cumulative environmental, community and health impacts for ECHO Member and partner groups. This includes refinement of anthropogenic disturbance maps, linkages with the expanded BC LEO Network, developed by FNHA, and partnering to develop the Nechako Watershed Portal and ECHO Network Portal.
Healing indicators	Indicator frameworks tend to create disconnects between environment, health and community issues. Integrative responses developed by ECHO include: • Healing indicators, which are co-designed using decolonial 'two-eyed seeing': with one eye informed by Indigenous ways of knowing and the other by western science. Diverse funding partnerships have been harnessed to progress ongoing Healing Indicators work, in conjunction with the First Nations Health Authority, and informed by the First Nations Population Health and Wellness Agenda, as well as related ecological indicator work (Stelkia et al 2021). • A "Health in the Watershed" Atlas, developed with the Battle River Watershed Alliance (for 2022 release) is an integrative framework for watershed level indicators with implications for future 'State of the Watershed' reporting.
Integrative assessment tools	Responding to the need for more integrated assessment of the impacts of resource extraction has been a key focus for ECHO Members (see Brisbois et al 2021, Buse et al 2020, Hoogeveen et al 2021 and Hoogeveen et al 2020). Related tools and processes explored via ECHO in response to this need include: • Risks and Benefits Calculator in partnership with New Brunswick Environmental Network

Summary of tools and processes	How they show up in ECHO
	• [Integrated Regional Profile Guide](#), in partnership with the [Cumulative Impacts Research Consortium (CIRC)](#) • Adaptation of the CalEnviroscren methodology to the BC context in partnership with the CIRC, the [Northern Health Authority, Office of Health & Resource Development](#), and the [Centre for Environmental Assessment Research](#), leading to related pilots across the Network (Buse et al 2021).
Youth engagement	Child and youth engagement in ECHO occurs through its regional cases, ECHO university students and trainees, and relationships formed with schools and communities that partner with the ECHO Network. One example is the [Koh-Learning in our Watersheds project](#).

8 ECHO Outcomes

"As the Network expands and its connections grow, it becomes increasingly capable of influencing communities and systems".

- ECHO 2020 Learning and Impact Plan.

"What we think and talk about expands into action. That is what we are doing – expanding into action".

- Lheidli T'enneh Elder Darlene McIntosh

A system change lens

ECHO has grappled with how to evaluate its work. The 'six conditions of systems change' (Kania et al, 2018[26]) are used here to indicate ECHO's key areas of contribution and outcomes. ECHO did not begin with an explicit system change agenda, aiming instead to 'understand and respond' in more integrated ways. However, these six conditions help demonstrate the ECHO landscape and underscore ECHO's desire to move from better documenting decline and minimising harm from resource extraction (doing things better), to doing better things that support collective health. The strength of ECHO contribution to each systems change condition is indicated as follows.

---

[26] See https://www.fsg.org/publications/water_of_systems_change.

Figure seven: ECHO contribution to systems change conditions

Minimal (within and outside ECHO)	Emergent (underway and promising, limited to ECHO Network)	Progressing (evident, meaningful and likely to be ongoing, ECHO Network focused)	Significant (evident and substantial, influencing outside the ECHO Network)

Policies

including government and organisational policy, regulations, rules, priorities

Practices

including activities, procedures, guidelines, behaviour

Resource flows

including how money, people, information and assets are distributed

Structural change

explicit

Relationships & connections

including quality of diverse connections and communications

Power dynamics

including distribution of decision-making power, authority and influence

Relational change

semi-explicit

Mental models

including beliefs, assumptions, norms, taken for granted ways of operating that influence what we think and do

Transformative change

implicit

This lens indicates that ECHO has contributed most to building relationships and connections for change and influencing mental models, and least in altering power dynamics and policies regarding the health impacts of resource extraction. Some ECHO influence on changing practices and resource flows is emergent. Note that some ECHO impacts will be ongoing and some may emerge many years later. Large scale collaborations such as ECHO would ideally build in long term impact measurement to gauge effects over time.

Each system change condition or ECHO outcome area is unpacked below, and key ECHO outcomes are indicated in **bold.**

Policies

"Evidence [of harm] doesn't make change by itself".

- Operations Team

ECHO influence on public policy relating to health and resource extraction to date has been minimal. Lack of direct advocacy by ECHO around the health impacts of resource extraction led to an ongoing questioning of ECHO's change agenda and related tension within ECHO. Individuals within ECHO undertake advocacy themselves, but not on behalf of ECHO. An example of this is ECHO members making submissions to Canada's Federal Impact Assessment Act (2019). Some movement around indicators and health impact assessment in the regulatory and policy sense was linked to ECHO in the documentation, including input to this Act.

ECHO was more influential on **organisational policy and reporting**, especially for its health organisation partners in terms of **taking a more holistic approach to impact assessment of resource extraction applications**. ECHO examples are the Health in the Watershed Atlas developed by the Alberta Center for Sustainable Rural Communities (University of Alberta and ECHO network member) and Integrated Regional Profiles (Wilson et al 2018[27]).

ECHO members note that ECHO is **influencing conversations and building relationships that feed into policy contexts**. One example is that as a result of ECHO's work around Cumulative Impacts of Resource Extraction being noticed (led by Chris Buse in conjunction with the Northern Regional Case and the Cumulative Impacts Research Consortium), several ECHO members (Margot Parkes and Dawn Hoogeveen) are now on the technical advisory group for the [Indigenous Consortium of Indigenous Effects](#)[28], helping to influence policy and fill policy gaps.

---

[27] See https://www2.unbc.ca/sites/default/files/sections/cumulative-impacts/circintegratedregionalprofileguidefinal.pdf.

[28] See https://www.icce-caec.ca/.

ECHO publications also have the potential to influence public and organisational policy. Two policy briefs have been produced from projects that were partially ECHO funded (Hoogeven et al 2020 and Buse et al 2020).

The COVID-19 pandemic was considered to have heightened the risk of poor land use planning and negative impacts of resource extraction, given that public health personnel are "diverted and exhausted" due to focusing on the pandemic.
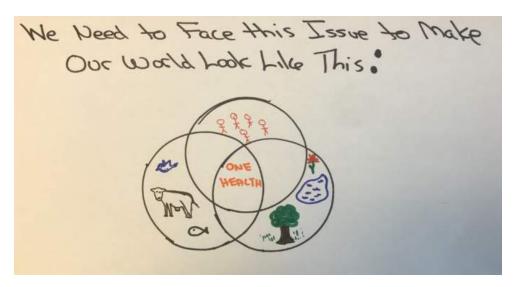

Image from the 2018 Photovoice ECHO initiative

Practices

"[ECHO] research and report publications have filled knowledge gaps on the connections between extractive industry development and effects on social, economic, cultural determinants of health in Northern BC and beyond. We use this data in every Environmental Assessment".

- Northern Health

ECHO influence on practices relating to health and resource extraction to date is emergent (underway and promising). For example, ECHO's partnership with the Northern Health Office of Health and Research Development, is creating **more integrative approaches to health impact assessment,** which created the base for a co-hosted (Northern Health and ECHO Network) and highly subscribed session on "Health Impact Assessment: Research, policy and application" at the 2022 International Association for Impact Assessment in Vancouver in May 2022.

While ECHO has not directly influenced resource extraction practices, ECHO has supported other changes in practices across its Network and beyond in ways that include:

- **Increasing intersectoral collaboration** through funding regional case partners to engage.

- **Increased collaboration across sectors** and openness to collaboration.

- **Shifts from deficit to strengths-based approaches to health impact assessment**, for example FNHA mapping has moved from being deficit-focused to mapping intactness and strengths (2020 ECHO Annual Meeting Summary).

- **More integrated impact assessment**, supported by tools and processes such as the Risks and Benefits Calculator, which was completed in 2019 with ECHO funding.

- **Increased involvement of children and young people** across the work of ECHO: "*Involving youth is now core [to ECHO work], when earlier it was an added bonus*" (ECHO Research Manager).

- **Increased engagement with communities and valuing of Indigenous, local and community knowledge**: "*Validating and valuing non-academic perspectives and views, holding up people with local knowledge, traditional knowledge and allowing these expert voices to be heard. [This is] an important contribution of ECHO; it's empowering and validating for these folks, for their knowledge to be respected*" (ECHO Operations Team).

- Creating visual ways to describe and more effectively **communicating health impacts and good practice for assessment** (example below, see also Fumerton and Western 2021 https://www.youtube.com/watch?v=wcVlYton5RQ).

Many ECHO members attribute changes in their practice to ECHO, such as **sharing tools and resources** and **seeking new connections and opportunities** (Regional Case Conversations 2019).

Resource flows

Over five years ECHO has catalysed multiple resource flows within the ECHO Network, through its university research leads, regional case partners and its collective work. This involves:

- **Significant information and knowledge exchange** via ECHO (see ECHO Outputs), the creation of an ECHO Zotero Library for the Network, and annual gatherings that draw on resources of the whole Network.

- Significant positive **movements and flows of people involved** in ECHO, including:
    - movement between ECHO members across partner organisations
    - new voluntary and paid roles
    - career progressions
    - promotion of ECHO members within academia
    - provision of jobs, secondments and exchanges within and between ECHO partner organisations.

- **Funding leveraged** via ECHO (33 ECHO related projects gained external funding), including funding flows to regional case partners and community partners via projects.

- **Mutual capacity strengthening** amongst ECHO Network members. ECHO partners with CoPEH Canada around capacity strengthening, including supporting communities of practice around ecosystem approaches to health (see also www.cpha.ca/edge).

- Capacity strengthening is embedded in ECHO's trainee programme, and lessons from ECHO have **influenced teaching curricula** (note there is no degree path from ECHO).

- Mentoring and research opportunities for trainees.

Managing transitions and succession has been an ongoing challenge for ECHO, as people in key roles change. Having partner and funding agreements has supported continuity over the five years.

Members of the ECHO Network team on the unceded traditional territory of the Wolastoqiyik (Maliseet) and Mi'kmaq peoples in Moncton, New Brunswick in 2019

Relationships and connections

"The community that has been created, can't be underestimated".

- Operations Team.

"ECHO has enabled our department and team to come together in ways we could not have. It has allowed for stronger collaboration and ease amongst us, which I think will break down barriers beyond this project and contribute to better quality work across the board".

- Regional Case Conversations 2019

"Where do we find space to honour complexity? ECHO is a space for that. We are less likely to burnout and give up because we have the network and are more likely to be courageous or find support through ECHO".

- Margot Parkes

ECHO has **catalysed significant intersectoral relationships** amongst the people in its 130+ strong Network, many of which would not have happened otherwise and are likely to be ongoing. ECHO has also enabled people to **make connections between issues and ideas**, and to **form and deepen relationships with places and with nature.** The ECHO network is seen as a **valuable space to explore complexity** that is rare and not available in other contexts. Often, the ECHO Network has enabled the holding of space within its partner organizations to have conversations around complex intersectoral challenges.

The network itself is seen as a **unique source of collective wisdom** that members can tap into when grappling with difficult and complex issues. It is also a **source of mutual learning and support** in spaces where the issues are overwhelming and feelings of isolation can be common: *"ECHO makes us feel like we are not alone, in challenging, sometimes depressing spaces"* (Operations Team).

ECHO members know that through relationships and trust, magic can happen. The relationships, friendships and connections built through ECHO have enabled:

- **Indigenous perspectives becoming more integrated into** ECHO-related organisations
- Difficult conversations and dealing with challenging subjects
- The opening of doors that would not have opened otherwise, to **new collaborations, projects, research and opportunities,** and a reason to reach out and talk about health impacts
- **New and ongoing partnerships** between previously unconnected organisations and sectors, including access to Indigenous leaders, young people, academics and health practitioners

- New understandings, **new ways of thinking** and an understanding that the challenges are similar in Canada and globally
- Encouraging a new cadre of research trainees to be courageous in asking difficult questions, pushing the boundaries of sectors, and encouraging collaboration among sectors, disciplines, and organizations.

Creating space for having different conversations, through for example having an Equity Lead in ECHO, has fueled conversations on equity issues.

> *"[ECHO gives] relief in being in this complex space and not feeling alone, being an environmental health officer and hearing all the time the personal and environmental impacts going on. It took a lot of personal and professional development, from working with First Nations communities, to get in the space of how will I make any sort of a difference or change? That [ECHO] launch day was the first day of feeling I am not alone. I have grown so much through the connections made".*
>
> *- Operations Team*

ECHO members exchanging ideas in Vanderhoof

Power dynamics

ECHO's focus on the effects of resource extraction brings it face to face with ongoing violence against Indigenous peoples, intergenerational trauma, social inequities and ecological trauma through biodiversity, pollution and species loss, all of which play out in complex ways in the lives of individuals, households and communities. Navigating all of this authentically and skilfully is difficult. ECHO members note the hidden and unspoken nature of many of these power dynamics, and the need to 'stay with the trouble' despite this (Parkes et al 2019).

ECHO has had no discernible influence on the core power dynamics perpetuating harmful resource extraction in Canada (and was not set up to do this). ECHO's own network has mirrored the wider systemic forces at play in terms of equity and power dynamics, including marginalisation of underrepresented voices, gender inequalities, diversity, inclusion and representation issues and institutional power and hierarchy.

Some key ways that ECHO has engaged with power dynamics within ECHO and in the space of health impacts of resource extraction are:

- **Raising equity, diversity and inclusion (EDI) issues** and **growing capacity around EDI understanding** through ECHO Network publications and the work of Team Equity (see for example Hoogeveen et al 2021, Sloan Morgan 2020 and Hoogeveen et al 2020). ECHO's Critical Reading Group discusses readings related to topics such as racial environmental justice, and is also a space for ECHO members to engage with literature produced by ECHO members.

- **Making space for Indigenous knowledge and perspectives**, for example via ECHO's Land, Health and Healing Gathering in June 2021. While ECHO was not able to morph into an Indigenous-led collaboration, it has consciously chosen to partner with and support Indigenous-led work and decolonising processes.

- **Supporting career progression** within the ECHO Network.

- **Making space for young people to connect with and influence ECHO** (see Youth Engagement).

Messages for Our Youth" quilt from the Health and Climate Change in Fort William First Nation project. Submitted to ECHO Reflections in Art by Lindsay Galway and Elder Elizabeth Esquega.

Mental models

"ECHO has led me to consider Indigenous views and perspectives first, and as a central component to the work".

- Operations Team

The influence of ECHO on the mindsets of people in the ECHO Network (and some outside the Network) is evident and likely to be ongoing. ECHO has supported mindset change in terms of:

- Integrative thinking – connecting E-C-H and **making holistic health connections**, including bringing human and non-human health into conversations.
- **Learning about, valuing and foregrounding Indigenous knowledge and perspectives:** *"First Nations communities speak to the issues and interconnectedness of various aspects of health better than anyone else"* (Operations Team).
- Increased ability to articulate health impacts on different places and communities.
- Valuing the importance of collaboration and **intersectoral working.**

Regional case conversations with 18 ECHO participants in 2019 noted:

- Growing awareness of how things are connected across domains, scales and roles.
- Noticing how spiritual and equity-informed perspectives were influencing the way they approached their scientific work.
- Community organisations taking a regional, provincial and national view and academic researchers understanding how knowledge is used and generated at a community level.
- Participation in the ECHO network has been a transformative experience for some, **changing individual mindsets and practices**, their perception of themselves and the way they will work in the future.

At the same time, ECHO has had minimal influence on mindsets to date outside of its Network, with limited reach of its knowledge outputs and further ECHO findings and learning in development. ECHO has also run into some barriers to shifting mental models, including Network members having trouble imagining new futures and improved practices, or staying focused on what's not working rather than what is or could be working.

9 ECHO Learning

This section shares key ECHO learning in terms of challenges and opportunities relating to integrative work and what enables this work. It includes questions for integrative initiatives to consider.

The challenges and opportunities of integrative and intersectoral work

"People in the network were uncomfortable learning that they were challenged imagining integration, that is confronting, an unlearning as much as a relearning. Huge push back once folks were confronted with this. The network allowed us to push into those realms".

"There are implicit differences among people that are usually not voiced, most of the time. Diversity can result in tokenism that can undermine the principles of equity, diversity and inclusion [EDI] – EDI are tricky to hold well at the same time. We need to consider EDI in terms of where we convene meetings, who with, how, who we employ, and who we spend time with sharing information".

"One of the tensions associated with the process of making and maintaining relationships, was the need to invest time in doing so. Some members felt the time the network provided them to make connections enriched and made their work more meaningful. Others felt the time required to stay connected and work collaboratively with network members was onerous and sometimes difficult to justify".

- Regional Case Conversations 2019

In our current paradigms and systems, integrative and collaborative work is uncomfortable and exhausting: *"People keep running into triggers and barriers"; "Working online with 80 people is hard".* Integrative work involves navigating barriers of all kinds, including mindsets, policies, language differences

(English remains the default language), institutional blocks and power dynamics. It takes diplomacy, persistence, willingness to be uncomfortable and an ability to work 'in the grey'.

ECHO's research design involved developing, testing and refining tools via regional cases, then convening with external groups, including decision makers, to support utilisation of these tools and processes and intersectoral action as a result. COVID-19 halted ECHO's ability to convene in-person and significantly disrupted turning knowledge to action as:

- Regional case partners were diverted to public health priorities in 2020/2021, and especially the two health authorities.

- ECHO Network activities reoriented to engaging within the Network, and especially with network trainees.

- Almost all knowledge to action activities planned for 2020/2021 were postponed, with only some tentatively scheduled for 2022.
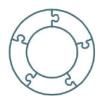
Further challenges and opportunities for the ECHO Network, in terms of its experiences to date and insights to inform future phases of work are synthesised below. Each challenge or opportunity poses a question for others doing this kind of work to consider. Note that most if not all of these challenges were known to ECHO at the outset and have proved hard to shift.

Imagining new and different

"It is challenging for people to imagine new futures. If we can't imagine a future where these things are resolved then how do we work towards the future we want?"

Default patterns and status quo thinking is strong. In integrative work, creative thinking needs to be facilitated and encouraged to imagine how things could be done differently – this is key to change. ECHO has found arts based and narrative methods to be enablers of integrative thinking.

How might we imagine different futures together?

Thinking and working in integrative ways

Far stronger interactions are needed between the environmental, community and health/social sectors. ECHO Midway conversations found that members' ability to notice and communicate E-C-H was uneven. Not everyone can or wants to think or work integratively, or even collaboratively. Barriers include sector and knowledge silos, power differentials, differences in expertise and approaches and competing priorities. An often unspoken issue in collaborations can be accountability to organisational agendas or other interests that may differ to those of the collaboration.

How might we grow capacities and practices for integrative thinking and intersectoral working?

Scale, history, power and accountability

The sheer number and scale of social, political and economic issues impacting on ecosystems, people and health is daunting. Feelings of ecological grief, social injustice and overwhelm are common. There are deep historical power imbalances from colonial violence and gaps in cultural and EDI competency.

There are also confronting constraints in Network members' own and partner organisations ability and appetite to address these issues; and identifying who needs to do what differently is a complex question in itself.

How might we navigate our shared history, power dynamics, equity, diversity and inclusion transparently and well together?

Leveraging strengths and managing transitions and change

"Even those who have been with the Network since its inception are unaware of the expertise of its members".

- Midway Conversations, 2020

There is uneven capacity and capability across the network; and knowing and playing to partner and members' strengths in terms of knowledge, expertise and skills can be challenging. Transition of leadership and key members diluted understanding and slowed progress; alongside wider disruptions including the UNBC strike and COVID-19.

How might strengths and expertise be leveraged across a network? How might transitions, succession and disruption be managed well?

Ability to communicate and influence

ECHO experienced ongoing difficulty clearly communicating what it is and does. As an observatory based in a university, influencing at a decision-making level was challenging for ECHO, as was expanding its integrative thinking approach outside the Network into policy and other settings.

How might research partnerships influence sectors and organisations outside of their sphere of influence?

What enables integrative and intersectoral work?

"The cross-scale work of the ECHO Network has underscored the need to embrace the (productive) tensions, including messy, emotional, socio-political spaces, that arise when teams as large and complex as the ECHO Network seek to engage outside sociopolitical, disciplinary, and sectoral comfort zones".

- Parkes et al 2019

Principles that support integrative, intersectoral work include:

- Leaving assumptions at the door.
- Bringing everyone into the room (including industry, for example), respecting different ideas, thoughts and beliefs, and recognising strengths in difference and diversity.
- Identifying and working towards common goals.
- Being hard on the issues and easy on the people.
- Intergenerational work and bringing through future change makers (this was a focus in ECHO).
- Sharing tools and processes that support working in ways that reflect principles of equity, diversity and inclusion.

Below is a summary of practices that ECHO has found enable integrative work, or things that need to be paid attention to and developed within complex collaborations.

Frame intent positively and build evaluation in	- Even in emergent initiatives, intent needs to be clear and shared to guide action on specific outcomes and outputs (fuzzy or contested intent wastes time and energy) - Frame purpose positively, towards health and what would most benefit all, including other species - Resource and embed evaluation from the start, with clear roles and accountability for evaluation and learning processes
Prioritise Indigenous, youth and intergenerational engagement	- Resource and make space for Indigenous views, voices and leadership - Indigenous world views are holistic and instinctively connect E-C-H; follow that lead - On a spectrum of Indigenous-informed to Indigenous-led, be clear where you stand and what you aspire to - Support learning about Indigenous perspectives, while striving not to over burden Indigenous individuals and communities in the process - As well as Indigenous people, proactively recruit and work with young people - Support intergenerational engagement

Center equity

- Facilitate conversations about equity issues across all activities (this was part of the role of 'Team Equity' in ECHO)
- Resource people to engage
- Discuss and seek to address what gets in the way of engagement and taking action, including the hidden, the obvious and the challenging
- Have a proactive strategy to raise and strengthen cultural, linguistic and EDI competency - offer training, mentorship, advisory roles and cultural assessments (one workshop isn't enough)
- Resource translation of information into French (in the Canadian context)
- Provide for equity in all budgets and build equity work into meta, regional and local work plans

Distributed leadership, creativity and skilled facilitation

- Distributed leadership is needed in complex collaborations to maintain momentum and workflow in a context of busyness, competing priorities and churn
- Use arts-based and creative approaches to explore and communicate complex issues
- Convene across networks to harness wider expertise on difficult issues and create opportunities to play to member strengths
- Use experienced facilitators to help navigate tensions and difficult conversations, and provide training on how to address tension and conflict constructively
- Share examples of what integration looks like

Nurture authentic relationships, humility and vulnerability

- Invest time in building trusting relationships
- Address conflict and tension as it arises, so it doesn't flow out into wider contexts
- Have fun and be social together
- Embed processes to connect with nature and each other face to face and virtually[29]
- Prioritise experiential learning and make time to talk through complex challenges being faced
- Find ways to compensate trainees and volunteers for their time – if not financial, ask people what they would like from their association with the initiative (e.g. training, publications, experiences)

---

[29] For example, Sandra Harris took ECHO members on a virtual lakeshore walk in the traditional territory of the Cas Yikh, Gitdimt'en (Bear) Clan of the Wet'suwet'en, Hazelton, BC, to open the 2020 online ECHO Network gathering, see https://www.youtube.com/watch?v=IgiOqZx1Z2w.

Pursue good practice collaboration and collective impact principles

- Find common ground
- Openly dialogue about the strengths and challenges of each partner/member and what each can bring to the work - put out calls for expertise as required
- Practice active listening and being present
- Get important things in writing, including expectations
- Match resources to priority needs and tasks
- Create accountability mechanisms to help keep everyone on task
- Ensure capability and capacity to meet priorities
- Create an induction package for newcomers
- Develop engagement and communication strategies at local, regional and meta levels focused on changes sought, target audiences and key deliverables
- Allow for anonymous contributions and suggestions – once the nature of these are understood, address them at appropriate levels and find ways to manage them over time

10 Pathways Forward

ECHO Network members indicating where they are from at the ECHO launch event in 2017.

"Push into the new instead of rearranging the status quo."

Continuing with the six conditions of systems change framework, pathways from the ECHO experience to develop further in integrative work are presented, then briefly discussed. The six conditions triangle is 'flipped' below, to foreground mindset shift and prioritise the transformational power of centering indigenous knowledge, equity and integrative ways of thinking and working. It is important to note however that *"Shifts in system conditions are more likely to be sustained when working at all three levels of change"* – transformative, relational and structural (Kania et al 2018).

Figure eight: ECHO threads

Policies

Identify structural change focus (policy, legislation, regulation)

Clarify accountability for action

Practices

Identify shared social change agendas

Build capacities for integrative work

Resource flows

Resource integrative work

Resource equity work, including diverse engagement

Structural change

explicit

Relationships and connections

Bring the whole system into the room

Support intergenerational and intersectoral working

Embed community voice/engagement

Power dynamics

Enable Indigenous self-determination

Co-design with those most affected

Enable youth engagement and leadership

Relational change

semi-explicit

Mental models

Prioritise Indigenous knowledge and practices

Center equity

Communicate integrative work and its value effectively

Transformative change

implicit

Changing how we work together and what we prioritise is key to transformational change. For transformative, system level change, recognising and valuing indigenous knowledge and practices isn't enough. Centering and prioritising indigenous knowledge is required, in ways that work for indigenous peoples and are appropriately resourced and supported. This means power sharing by non-Indigenous people and institutions. It requires active 'unlearning' processes to check our biases and defaults, and a willingness to learn about Indigenous world views and blend Indigenous and Western knowledges.

> *"We have an Indigenous lens and a colonial lens, they are different ways of looking at it, we need to come together to blend the two, to achieve relationship, balance, understanding, to work together".*
>
> *- Lheidli T'enneh Elder Darlene McIntosh*

> *"Listen to the Indigenous knowledge holders who know our environment. It's up to everybody in Canada to be looking after Mother Earth. What are we going to do for her? How will we reciprocate what she does for us?"*
>
> *- Lheidli T'enneh Elder Darlene McIntosh*

Champion equity and accountable relations - educate, train and upskill people to see with anti-racist[30], equity, diversity and inclusion lenses, and to pay close attention to these issues across the work, including other species needs. See for example this recent article from Kania et al 2022 on centering equity in collective impact.

Explore and **communicate integrative work well and in multiple ways to engage more** people and reach new audiences, including through storytelling, other arts-based methods and social media. Get better at pushing evidence to established channels and decision makers.

Where appropriate, integrative change efforts benefit from clarifying their **intent to inform policy and legislation** and by **focusing on** a few **shared agendas**. This requires forging connections with change agents and advocacy efforts and a willingness to 'speak truth to power'. Project leads need to be fully behind the people they bring on their teams to do this difficult work, to allow them to make mistakes and ensure them that they 'have their backs'.

> *"This is about truth and reconciliation".*
>
> *- Lheidli T'enneh Elder Darlene McIntosh*

---

[30] See for example Core Principles to Support Anti-Racism in Collective Impact, Collective Impact Form, March 2022.

It also means building an explicit social change orientation into integrative work, for example by utilising the six conditions of systems change to inform research design. This social change agenda needs to turn inwards as well as outwards, to disrupt the norms and power dynamics within our teams, settler institutions and public policy. Being specific about the change desired internally and externally helps focus effort, attract participants and bridge and connect existing work. Seeking to better understand and inform action is not enough:

> *"Addressing challenges that arise from resource extraction involves more than understanding and taking notice for action; the work within the ECHO Network has reinforced this point repeatedly".*
>
> *- Sloan Morgan 2020*

Enable youth engagement and leadership in integrative work, and **intergenerational connections**. Children, young people and our elders together hold the wisdom, creativity and energy to power new thinking.

The change agenda should be co-designed with people who are most affected by the issues and with people connected to decision makers (and ideally with decision makers). Bring all parts of the system into the endeavour in constructive ways, including industry, political and other decision makers.

> *"[There] is a yearning for people to come together, how can we support that, link people in a gentle, fun way, so we listen and witness one another, have courageous conversations and acknowledge all that shows up without judgement and labelling".*
>
> *- Sandra Harris*

Resource and build capacities for integrative work. Integrative thinking and practice at the ECHO scale is rare and currently requires heroic leadership that can carve space for integrative work in settler institutions not designed for it. Capacities for integrative work need deliberate fostering and integrative leadership needs supporting, especially as our institutions catch up with the integration imperative.

Finally, 'stay with the trouble' – social change work is hard. It requires getting uncomfortable, persistence and learning to navigate the grey. It also requires bringing diversity together and working differently together to create the new.

> *"Good things take time. It is incredibly valuable to invest time and effort in conversations and connections. If we did more of this we would collectively create better futures. We need to bring different views and expertise together".*
>
> *- Margot Parkes*

Without initiatives like ECHO that seek to collaborate across sectors and work differently, the status quo endures. The 'echoes' of ECHO will continue in the coming years, through the combined efforts of its network members and the ripples of ECHO related work. Ideally, ECHO would be revisited in five to ten years to track what has eventuated over the longer term.

"It's long-term work – we need a long-term view of impact".

- Chris Buse

An extract from a creative work by Joy Harjo is shared below as a final reflection. This was read as part of the November 2021 ECHO Reflections in Art Workshop. It highlights central themes for ECHO, including our interconnectedness and the need for humanity to remember our place in the web of life.

Recognize whose lands these are on which we stand.

Ask the deer, turtle, and the crane.

Make sure the spirits of these lands are respected and treated with goodwill.

The land is a being who remembers everything.

You will have to answer to your children, and their children, and theirs —

The red shimmer of remembering will compel you up the night to walk the

perimeter of truth for understanding.

As I brushed my hair over the hotel sink to get ready I heard:

By listening we will understand who we are in this holy realm of words.

Do not parade, pleased with yourself.

You must speak in the language of justice.

Extract from 'Conflict Resolution for Holy Beings' by Joy Harjo[31]

---

[31] https://www.poetryfoundation.org/poems/141847/conflict-resolution-for-holy-beings.

References

The documents below marked * can be accessed at https://www.echonetwork-reseauecho.ca/resources.

Berry, P., & Schnitter, R. (Eds.). (2022). Health of Canadians in a Changing Climate: Advancing our Knowledge for Action. Ottawa, ON: Government of Canada. https://changingclimate.ca/health-in-a-changing-climate/.

*Brisbois, B., Hoogeveen, D., Allison, S., Cole D., Fyfe T. M,. Harder H.G,. Parkes M. W. (2021). Storylines of research on resource extraction and health in Canada: A modified metanarrative synthesis. *Social Science and Medicine*. https://doi.org/10.1016/j.socscimed.2021.113899.

*Brisbois, B. W., Reschny, J., Fyfe, T., Harder, H., Parkes, M. W., Allison, S., Buse, C., Fumerton, R. and Oke, B. (2019). Mapping research on resource extraction and health: A scoping review. *The Extractive Industries and Society, 6(1),* 250-259. https://doi.org/10.1016/j.exis.2018.10.017

Brubacher, J., Gislason, M., Parkes, MW., Buse, C., & Takaro, TK. (2018). A spatial method for quantifying multiple anthropogenic exposures on the environment for use in environmental health research. Cascadia Annual Symposium on Environmental, Occupational and Population Health, January 3, 2018. Abbotsford, BC.

Buse C, Champaigne B Haara S, Yarmey N, Fumerton R, Parkes MW, (2021). Tips, Tricks and Tools for Tackling Complexity in Social-Ecological Systems: Attending to Cumulative Impacts and Persistent Challenges that Cross-Cut Environmental, Community and Health Systems. ECHO Pulse Day 5. (Nov 26, 2021). https://www.echonetwork-reseauecho.ca/echo-pulse-resources#Enviroscreen.

*Buse, CG., Friberg R, Arnold L and Hanna K. (2020). Unlocking the promise of 'integrated' regional and strategic environmental assessments based on a realist review of the scholarly literature. Kelowna BC: Centre for Environmental Assessment Research, University of British Columbia. Tinyurl.com/2p999cxv

Clermont, Holly, ECHO Post Doc Fellow, Key Findings from Midway Conversations, July 2020.

De Leeuw, S., Parkes, M. W., Sloan Morgan, O. S., Christensen, J., Lindsay, N., Mitchell-Foster, K., & Russell Jozkow, J. (2017). Going unscripted: A call to critically engage storytelling methods and methodologies in geography and the medical-health sciences. The Canadian Geographer/Le Géographe Canadien, 61(2), 152-164. https://onlinelibrary.wiley.com/doi/full/10.1111/cag.12337.

*Dolan, S., Kutzner, D., Parkes, M.W. (2018). 2018 ECHO Annual Meeting Report Summary. ECHO Network and Northern Health, Prince George, BC.

ECHO Network Regional Case Conversations Summary, 2019.

ECHO Network Survey, 2019.

ECHO Learning and Impact Plan 2020.

ECHO Theory of Change 2020.

Gillingham, M. P., Halseth, G. R., Johnson, C. J., & Parkes, M. W. (Editors). (2016). The Integration Imperative: Cumulative Environmental, Community and Health Impacts of Multiple Natural Resource Developments. Springer International Publishing AG.

Gislason MK, Sloan Morgan O, Mitchell-Foster K, Parkes MW. Voices from the landscape: Storytelling as Gislason, M. K., Sloan Morgan, O, Mitchell-Foster, K., & Parkes, M. W. (2018). Voices from the landscape: Storytelling as emergent counter-narratives and collective action from northern BC Watersheds. Health & place, 54, 191-199.
https://pubmed.ncbi.nlm.nih.gov/30321859/

*Hoogeveen, D., Williams, A., Hussey, A., Western, S., Gislason, M.K. (2021) Sex, mines, and pipe-lines: Examining 'Gender-based Analysis Plus' in Canadian impact assessment resource ex-traction policy. *The Extractive Industries and Society*, Volume 8, Issue 3, 2021. https://doi.org/10.1016/j.exis.2021.100921

*Hoogeveen, D., Gislason, M., Hussey, A., Western, S., & Williams, A. (2020). Gender Based Analysis Plus: A knowledge synthesis for the implementation and development of socially responsible impact assessment in Canada.

Kania, John, Junious Williams, Paul Schmitz, Sheri Brady, Mark Kramer and Jennifer Splansky Juster. (Winter 2022). Centering Equity in Collective Impact. Stanford Social Innovation Review.

Kania, John, Mark Kramer and Peter Senge. (2018). The Water of Systems Change. FSG.
https://www.fsg.org/publications/water_of_systems_change

*Kutzner, D., Parkes, M.W., Hadley, L. (2019). 2019 ECHO Annual Meeting Report. ECHO Network and Northern Health, Prince George, BC.

*Kutzner, D., Vinegar, M., Dolan, S., Parkes, M.W. (2017). ECHO Launch Event Meeting Report. ECHO Network and Northern Health, Prince George, BC.

*Labron, M., Kutzner, D., Skrlac, M., Hadley, L. Parkes, M.W., (2020). 2020 ECHO Annual Meeting Report. ECHO Network and Northern Health, Prince George, BC.

Maguet, S. (2019). 2019 Environment, Community, Health Observatory Network Learning & Impact Results. ECHO Network and Northern Health, Prince George, BC.

*Parkes, M.W., Allison, S., Harder, H.G., Hoogeveen, D., Kutzner, D., Aalhus, M., Adams, E., Beck, L., Brisbois, B., Buse, C., Chiasson, A., Cole, D.C., Dolan, S., Fauré, A., Fumerton, R., Gislason, M.K., Hadley, L., Hallström, L.K., Horwitz, P., Marks, R., McKellar, K., Barnes, H.M., Oke, B., Pillsworth, L., Reschny, J., Sanderson, D., Skinner, S., Stelkia, K., Stephen, C., Surette, C., Takaro, T.K., & Vaillancourt, C. (2019) Addressing the Environmental, Community, and Health Impacts of Resource Development: Challenges across Scales, Sectors, and Sites. Challenges 10(1): 22, https://www.mdpi.com/2078-1547/10/1/22.

Parkes, M.W., Poland, B., Allison, S., Cole, D., Culbert, I., Gislason, MK., Hancock, T., Howard, C., Papadopoulos, A., & Waheed, F. (2019) Preparing for the future of public health: The ecological determinants of health and the call for an eco-social approach to public health education. Canadian Journal of Public Health. https://doi.org/10.17269/ s41997-019-00263-8.

Parkes, M. W. (2016), The ECHO Network (Environment, Community, Health Observatory): Strengthening intersectoral capacity to understand and respond to health impacts of resource development: Research Proposal and Research Proposal Appendix.

Parkes, M. (2015). 'Just add water': Dissolving barriers to collaboration and learning for health, ecosystems and equity. Ecosystems, Society and Health: Pathways through Diversity, Convergence and Integration. L. Hallstrom, N. Guelstorf, and M. Parkes, Eds. Toronto: McGill Queens University Press, 184-222.

Skrlac, M.M, Bates, M., Kennedy, A., Thorne, S., Onabola, C., Doyon, J., McKinnon, T., Cranmer, J., Parkes, M.W. (2022). 2021 ECHO Network Knowledge Exchange Sessions Report. ECHO Network, Prince George, BC. https://www.echonetwork-reseauecho.ca/echo-pulse-resources.

Skinner, S (2021). World According to ECHO - Glimpses of environment, community, and health connections in the COVID era. A padlet submission, available at: https://www.echonetwork-reseauecho.ca/arts-based-narrative-approaches.

Sloan Morgan, O. S., Hoogeveen, D., Farrales, M., Gislason, M. K., Parkes, M. W., & Harder, H. G. (2020). Resource extraction and intersectoral research: Engaging accountable relations in the Environment Community Health Observatory Network. *Environment and Planning C: Politics and Space*. https://doi.org/10.1177/2399654420951805.

Sloan Morgan, O. (2020). "Why would they care?": Youth, resource extraction and climate change in northern British Columbia, Canada. The Canadian Geographer / Le Géographe Canadien, in press, DOI: 10.1111/cag.12605.

Thompson, S. & Aked, J. (2011). *Five Ways to Wellbeing: New applications, new ways of thinking.* London: New Economics Foundation. http://www.neweconomics.org/publications/entry/five-ways-to-well-being-new-applications-new-ways-of-thinking.

Wilson, M., Gauli-Sharma, B., O'Toole, R., and Buse, C. (2018). Integrated Regional Profiles: Preparing regional profiles to explore connections across environment, community and health values. Cumulative Impacts Research Consortium, University of Northern British Columbia, Prince George, BC.

Websites and links (in alphabetical order)

CalEnviroScreen https://oehha.ca.gov/calenviroscreen

Canadian Community of Practice in Ecosystem Approaches to Health (CoPEH-Canada) Multi-site Fieldcourse https://copeh-canada.org/en/keyareas/training-and-capacity-building/15-champs-d-action/245-copeh-canada-course.html

Canada's poor environmental score card https://www.nationalobserver.com/2019/11/11/news/canada-gets-poor-marks-latest-climate-report-card

CBC media article on indigenous protection of nature https://www.cbc.ca/news/canada/british-columbia/wetsuweten-nation-eviction-coastal-gaslink-1.6249030

Comic jams http://healtharts.ca/comic-jams-intersectoral-research-and-responses-to-the-impacts-of-resource-extraction/

Cumulative Impacts Research Consortium https://www2.unbc.ca/cumulative-impacts/about-circ Dawn Hoogeveen's work https://www.sfu.ca/fhs/news-events/news/2021/mshrbc-awards-fall-2021.html and https://www.msfhr.org/1/award/healing-indicators-research-in-indigenous-health-impact-assessment-and-self-determination

ECHO Arts based and narrative approaches https://www.echonetwork-reseauecho.ca/arts-based-narrative-approaches

ECHO Network Portal http://iwrg.gis.unbc.ca

ECHO Regional Case information https://www.echonetwork-reseauecho.ca/regional-cases-2

ECHO Pulse Series https://www.echonetwork-reseauecho.ca/echo-pulse-resources

ECHO Tik Tok account: @echo_ruralab

ECHO Youtube Channel https://www.youtube.com/channel/UCITvn4za7JkSVrdcC1FNnvg

ECHO Zotero Library https://www.echonetwork-reseauecho.ca/zotero-library

First Nations Population Health and Wellness Agenda

Five ways to wellbeing https://neweconomics.org/2008/10/five-ways-to-wellbeing

Health Arts Research Centre

Indigenous Climate Action

Indigenous Consortium of Indigenous Effects

Joy Harjo, Conflict Resolution for Holy Beings: https://www.poetryfoundation.org/poems/141847/conflict-resolution-for-holy-beings

Koh-Learning in our Watersheds Project https://www2.unbc.ca/integrated-watershed-research-group/koh-learning-our-watersheds-transforming-education-connecting-students-communities-and-waterways

Lake Superior Living Labs Network https://livinglabs.lakeheadu.ca/

Leading principles and best practice for assessment and monitoring of resource development impacts – see Knowledge Translation Figures at https://www.echonetwork-reseauecho.ca/resources

Le Groupe de développement durable du Pays de Cocagne/Sustainable Development Group https://ecopaysdecocagne.ca/en/.

Risks and Benefits Calculator https://nben.ca/en/risks-and-benefits

World According to ECHO - Glimpses of environment, community, and health connections in the COVID era