indicators

The following indicators were derived from the discussions at Workshop 1 and previous indicator research undertaken by the Design Centre for Sustainability and its partner research groups.*

The proposed Water Indicators are:

impervious Surface Intensity

Tree Canopy Intensity

Natural Hydrology Intensity

Water Treatment Proximity

Stream Connectivity

Decentralized Water Distribution

Aquatic Environment Diversity

Ron Kellett, Sara Fryer & Isabel Budke. 2009 Specification of Indicators and Selection Methodology for a Potential Community Demonstration Project. Report for CMHC/NRCan.

water

Impervious Surface Intensity

INDICATOR

Impervious Surface Intensity reveals the extent of land area with a high rainwater runoff potential. Impervious surface intensity effects both water quantity and quality by influencing the amount of rainwater that drains to piped rainwater infrastructure or directly into receiving water bodies. Excess runoff damages natural habitat and hydrological functions by contributing to stream erosion, water quality degradation, and water temperature instability.

DESIGN METRICS

- Percent impervious surface
- Percent effective impervious area
- Difference between pre-development runoff volume and projected post development runoff volume

SUPPORTING STRATEGIES

- Policies and guidelines that limit the amount of impervious surfaces
- Encouraging the use of green roofs, rain gardens, and xeriscaping
- Monitor rainfall and groundwater
- Make accountable private and public sectors

water

Tree Canopy Intensity

INDICATOR

Tree Canopy Intensity reveals the extent of land covered by tree canopies. Tree canopies intercept and absorb rainfall thus slowing and limiting the amount that enters the storm water system.

DESIGN METRICS

- Percent tree canopy coverage

SUPPORTING STRATEGIES

- Encouraging urban tree planting programs led by both government and community initiatives

water

Natural Hydrology Intensity

INDICATOR

Natural Hydrology Intensity reveals the extent to which an area protects, restores, and creates natural hydrology. Natural hydrology is necessary for proper ecosystem functions, such as water filtration, infiltration, water and flood mitigation.

DESIGN METRICS

- Percent of existing/historical watershed that is protected
- Percent of streams with buffer zones (greater than?)
- Percent of area for infiltration and natural flooding and hydrological functions
- Change in runoff volume pre- and post-development

SUPPORTING STRATEGIES

- Characterize, asses and monitor every stream
- Create policies on stream management and monitoring
- Create policies on topsoil removal, replacement and soil building
- Create policies on buffer zones widths to be in proportion with the aquatic environment
- Design areas for flooding
- Monitor rainfall and groundwater

water

Water Treatment Proximity

INDICATOR

Water Treatment Proximity reveals the extent of the distance to water treatment facilities. The proximity of wastewater and drinking water facilities determines if the system is distributed or centralized. Distributed systems are more resilient and energy efficient.

DESIGN METRICS

- Percent of homes within X meters of a drinking treatment facility
- Percent of homes within X meters of a wastewater treatment facility
- Percent of businesses within X meters of a drinking treatment facility
- Percent of businesses within X meters of a wastewater treatment facility

SUPPORTING STRATEGIES

- Create updates wastewater policies on bylaws and policies
- Promote on-site systems
- Create heat exchange capabilities
- Create resource recovery capabilities
- Integrated zoning

Stream Connectivity

water

INDICATOR

Stream Connectivity reveals the amount of streams that intersect other streams or are uninterrupted by development. Stream connectivity promotes healthy ecosystems, for example, streams that are culverted can inhibit spawning of salmon.

DESIGN METRICS

- Percent length of a stream that is intact and not culverted
- Number of intersections of waterways

SUPPORTING STRATEGIES

- Promote buffer zone policies
- Promote stream monitoring and maintenance
- Promote community stewardship initiatives

water

Decentralized Water Distribution

INDICATOR

Decentralized Water Distribution reveals the degree to which distribution of drinking water, and the collection of sewage and rainwater is localized and evenly distributed per capita. A decentralized system is more resilient by distributing the load and decreasing the need for large energy intensive infrastructures.

DESIGN METRICS

- Number of storm drains per block
- Number of sewer hook-ups per block

SUPPORTING STRATEGIES

- Promote on-site water catchment, retention, and infiltration
- Regulate the use of low flush toilets, low water use faucets and appliances
- Label appliances with water usage
- Resource recovery
- Update water use policies
- Integrated zoning

Aquatic Environment Diversity

water

INDICATOR

Aquatic Environment Diversity reveals the diversity of aquatic environments within a given area. Maintaining or creating a diversity of aquatic environments increases biodiversity and stabilizes ecosystem functions.

DESIGN METRICS

- Number of aquatic environments within a given area

SUPPORTING STRATEGIES

- Promote conservation and stewardship programs
- Design areas for flooding

summary notes

The following summary notes were synthesized from the notes recorded during Workshop 1. The summaries identify themes that assist in describing key issues and developing design-based indicators.

water

Water Discussion Summary – April 16, 2009

Goals

Successful Examples

Moving beyond "why?" to "how?" We have the tools; we just have to figure out how to apply them and get everyone else to follow along. It's best to start with low laying fruits, successful examples to be convincing that ideas are not just pie in the sky. Low flush toilets for example. Need a clear direction that can be framed for politicians and public as a whole. Need the storyline that will fire up the representatives.

Paradigm Shift – No Waste / Design With Nature

With climate change and population growth as huge issues for the future we need visionaries for 2040 without political baggage. There is a massive paradigm shift coming and actions need to be prioritized to reach the vision – a strategy in the short term to reach the long term. Rather than upgrading out-dated archaic systems that are no longer acceptable, we need to think about a radically different approach. If we upgrade existing systems then we are stuck with them for another 100 years in which case we may miss the boat. Redevelopment creates the opportunity to get it right the second time. We need to change the infrastructure and/or increasing efficiency of both energy and water. We need to think about waste recovery/resource recovery: the resources are energy and water. There is no waste. 'Design with Nature' approach and reuse of resources. Fit-for-purpose approach for water use (recycle water in varying qualities in appropriate precincts). Create the business case for integrated design, utilizing nature's design principles - there are no wastes, only resources. Zoning is at the core of the problem for an integrated design process.

Distributed and Decentralized Systems

Distributed and decentralized systems make water more visible. We manage our own water and celebrate it. We are paying the price of not having integrated systems. We need to holistically bring people to get involved - Fisheries and agriculture, integrate business, with mobility with green streets.

Integration/ Dynamic Planning Process

Water Rules. We need to move fast - water is needed by everyone and every industry. And if we aren't careful everyone else is going to want our water – economy, agriculture, etc. We need a dynamic planning process that talk about synergies. How do you align to feed into the existing process? May 13th is next report to Metro Vancouver and July adoption of language.

Water Group Summary Notes

Vision for 2040
500 yr flood protection
Agriculture and individual water consumption benchmarks
Water quantity and quality
Healthy streams and watershed
Integrated zoning

water

Decentralized, distributive systems and management rather than centralized
Groundwater maintained, not depleted
Educated politicians & effective procurement

Principles

- There is no waste. There is only resource and resource recovery
- Individual stewardship and responsibility
- Management at individual and site scale
- Integration with other land uses and systems
- Educated politicians & effective procurement

Actions

- Water balance approach as the standard, by far
- Fit-for-purpose water management system (recycle water in varying qualities in appropriate precincts)
- Decentralized management
- Rainfall and groundwater monitoring
- Characterize, assess and monitor every reach of every stream
- Dissemination of information
- Hold private and public sectors accountable
- Performance standards for homeowners (slowing and treating stormwater before releasing)
- Financial support to encourage innovation at individual and site scale
- High efficiency appliances – labeled for water use as well.
- Plant trees, Increase topsoil
- Xeriscaping, Harvest roofwater, Green roofs, Rain gardens, Wetlands, Buffer zones
- Reduce impervious surfaces
- Design areas for flooding – natural ecosystem functions
- Agriculture efficient water use and management
- Distributed sewage systems
- Pollution source control
- Energy and Water integration
- Doing, Fostering and Enabling @ 3 scales:
- Property (individual): house and garden
- Neighborhood (municipality): roads, parking, commercial
- Watershed (provincial): land use, forestry, agriculture, urban, etc.

workshop 1 notes

The following un-edited notes were recorded during the Research Roundtable Workshop 1 group discussions.

Opening Statement from PC

There is a generational spectrum of people deeply committed to sustainability in this region. It reflects the culture of commitment that we really live in. This means that there may come a day when we can turn around and say, "We did it!" The strategy is all about streaming the collective intelligence in this room into a set of actions that is so compelling that people cannot say no to it. This is what we are striving for today in this workshop. And then, years down the line, we will be able to say, "hey, that was a great idea and it came from a research roundtable discussion."

Water Presentation - Kim Stephens

Moving beyond "why?" to "how?" We have the tools; we just have to figure out how to apply them. Working municipalities to align regional action with provincial goals. Provincial goals provide direction. Regional regulation drives action. How SxD can contribute. 'Living Water Smart, BC's Water Plan' is a visionary document that encourages governments and inspires people because it is well written with high-level language. Green Communities Project complements and supports Living Water Smart by offering the key message that the province is fostering partnerships, collaboration, innovation and integration and leveraging change through grants. LWMP is a powerful regulatory tool that has the potential to truly effect change. 3 theme areas for structuring Plan Elements: natural environment, sewage treatment, built environment. Liquid resource management plan is the point of integration for all 3. 'Design with Nature' approach and reuse of resources is key to climate change adaptation, which must be a part of the plan. Influence choices to create New Business as Usual which looks through the lens of sustainability.

Water group

Kim Stephens - Water Sustainability Action Plan for BC, Project Coordinator, **Water Chair**
Sheryl Webster – UBC, DCS, Project Coordinator, **Water co-chair**
Helena Farrell – UBC, DCS, student intern, **Recorder**
Daniel Roehr – UBC, SALA Assistant Professor (Not Present)
Derek Lee – PWL partnership, LA
Fin Donnelly – Rivershed Society of BC, Executive Director & Coquitlam, City Councilor (Not Present)
Hans Schrier – UBC, Institute for Resources, Environment and Sustainability, Professor
Patrick Lucey – Aqua-tex Scientific Consulting, Senior Aquatic Ecologist
Sarah Buchanan – Aqua-tex Scientific
Paul Ham – Green Infrastructure Partnership, past chair
Ted van der Gulik – Ministry of Agriculture and Lands, Senior Engineer Resource Mgmt Branch
Xenia Semeniuk – UBC, GreenSkins Lab, Researcher
Zo Ann Morten – Pacific Streamkeepers Federation

Kim - How do you align to feed into the existing process? It is challenging to communicate to elected official to get them onto the bandwagon. Have to have a good storyline. That is the significance of 'Living Waters Smart'. Until a year ago, didn't even have the document to show the mandate which offer authority under which to act. May 13th is next report to Metro Vancouver. Critical to get politicians into alignment with reference panel. Can have the targets and goal established, but when it comes to implementation, the real challenges are in managing individual builders.

Sheryl – Shares the understanding of the context. Utilize the expertise of others and apply to the problem.

Derek Lee – LEED policy lacks governmental regulation but is enforced at the municipal level. Need leaders within the community to set up the bylaws and regulation that can work at the municipal level.

Patrick – BOOKMARK. Procurement is hidden elephant in the room.

Hans – We can be visionaries without political baggage. Think about 2030 and water situation and how do we get there. Need to move fast! Built 30,000 houses last year with 30% low flush toilets. Missing the boat big time! Innovators have too many obstructions. Individuals have to break the law to be innovative and then ask for forgiveness. Living Water Smart is conservative.

Patrick - LWS was a political document for moving forward. To go beyond the need for "boutique" houses/ projects. Need to change entire cities and trying to change at that scale is beyond the ability of our society to cope with. The only way to do it is from a completely different funding perspective. Some one needs to pony up a Billion dollars. And this would be hugely profitable!! Done complete and thorough modeling.

Kim – This region is on the edge of being bold/visionary. (Patrick disagrees) Need to support of others to go before the board. Off the grid with water

Ted – Need successful examples to be convincing that ideas are not just pie in the sky. Low flush toilets for example. Get things to happen and be able to take credit for them and then can move on with credibility. Then is becomes easier to do more things. 40 years from now need low flush toilets everywhere, and all other high efficiency appliances. Have to force that to happen, make the best option available and the lowest prices. Perhaps a markets campaign?

Patrick – We build everything we talk about through design. I work for the developers. Not an academic. Moving away completely from a supply based infrastructure. Largest portion of water supply is our roofs and we don't capture that water at all. Visionary is not focusing on the water, it is focusing on the infrastructure with and integrated approach to resource management. We need a fit for purpose approach with both water and energy.

Kim - Metro Vancouver board will be adopting that language in a July meeting. That is the significance of a regulatory tool.

Patrick – the dilemma is that you can't fund innovation in this form of government at the scale we are talking about. Who is going to respond to an RFP? A bunch of engineering companies. Victoria as example. Could be completely off the grid, but won't because they can't put all that information in front of the taxpayers. We just can't fund the innovation using the usual procurement process - The risk and hazards.

Ted – Can keep doing the small things. Some of us are and need to get everyone doing them. Topsoil. Getting the right information out so it becomes a bylaw and gets developers to follow it.

Hans – Must keep the big vision for 2040. Climate change and population growth will be huge issues.

Derek – Can have discussion about energy on changing infrastructure or discussion on increasing efficiency that can have more far-reaching effects. Can take this discussion to water. Need a clear direction that can be framed for politicians and public as a whole.

Kim – How do we make this discussion relevant?

Hans- There is a massive paradigm shift coming

Sheryl-For example forcing innovation by making the reduction of effective impervious area on sites policy

Hans – water balance model is the right track because there is at least 5 things people can do on their own properties. Working at the individual level, then the neighborhood level. We gains enough momentum, politicians can be brought in and then looking at the watershed level. Then bring in agriculture and forestry

Derek – the key is the municipality establishing its own targets

Ted – when looking at water, have a lot of interrelated things such as food, there are questions that can be part of the visionary document that describes an issues holistically and is a way of bringing in people who might not get involved otherwise. Fisheries and agriculture can be brought in to see eye 2eye around water.

Kim –MetVan LWMP does not tell the story. Not enough of a visionary document. Need the storyline that will fire up the representatives. SxD cannot create that document. The Actions are in the LWMP, but you loose them all at the site scale because of the builder. How do we hold people accountable?

Hans – 2040 will have climate change, flooding issues, water pollution. Start with low laying fruits (can list 50 things that can help). Would be easy to come up with indicators. Lawns, rooftops, and archaic treatment systems that are no longer acceptable. Rather than upgrading out-dated systems, think about something radically different.

Patrick – Waste is an 18th century concept. Need to think about waste recovery. Concept is completely unscientific not based on reality at all. Need to move to a fit for purpose way of doing things. This is about understanding the business case for integrated design. How to optimize revenues in contrast to the cost for design. Must be revenue generating. Government can comprehend projects that don't cost the taxpayers money. Better understand nature's design principles. There are no wastes, there are only resources.

Derek – Southeast False Creek public funded project. It is the civic levels that will get the things done.

Patrick – have shown that retrofitting buildings can be profitable. But we have to stop and take a radically different approach.

Kim – SxD is trying to create a picture of what the region will look like, for it to be credible, it has to be consistent with the actions that will be approved on July 31st even though the reps don't know what they mean. Surrey is ready to establish the targets for rainwater management. They have to be successful so that everyone else follows. Targets vary by watershed, but the language is in place and the support needs to be there. Trying to bring it back to what SxD needs to be successful.

Derek – GVRD was an elected body with no teeth that had a vision. Was a think tank setting a framework that could go to municipalities with policy.

Patrick – Metering. Every house needs metering. Where is the rainwater metering? Stream metering? The information that is needed is not there.

Hans – Business as usual. Distributing systems are centralized and urbanites have no responsibility b/c govn't does everything. Why not mandate that citizens start harvesting rooftop runoff? Permit and support landowners to start innovating their own solutions. Feedback loops, metering, decentralized and distributed systems, roof water harvesting, 5000 litre tanks in New Zealand and Toronto, give up lawns 0 stormwater run off. Temporary permits with monitoring.

Derek – water credit system. Has a payback mechanism.

Patrick – assess and characterize every stream every reach and create a metric. Identify the risk and can get it front and center on management list. Streams are the pulse of the landscape. Will not find a healthy creek in a trashed landscape. The creeks are the metric for evaluating the health of the landscape.

Kim – this fits into the significance of the storyline for the board. All they see is dollars and sewage. They need actions and an integrated approach that they can be held to.

Hans- the knowledge is there, but how do we actually move the process forward to achieve regional sustainability.

Zo Ann – Had a completely off-grid home with beautiful topsoil which just got built on. Trees gone. New place, have to hook up to the sewer system. Cannot escape the systems in place, even when doing things

right. Protective ACTS are only reactionary and not protective. Vision is all about our water that everyone else wants.

Patrick – We do not live in an integrated fashion and we are paying the price. It is really difficult to plan for the long term and the short term at the same time with an integrated plan. We are using a governance model that is 200 years old.

Zo Ann – Politicians are not making good decisions about my own property and don't even know what's going on there. How can we integrate business, with mobility with green streets. Water Rules. And if we aren't careful everyone else is going to want our water – economy, agriculture, etc.

Ted – Need principles by which we can create a vision. How we are going to enable, foster, do? Then need a one-pager that explains business feasibility. One Pagers and be implementable as bylaws and then the plan starts to get put in place.

Hans: Vision - by 2040 minimize the flood risk with strategy that has 500 yr flood protection, benchmarks for agriculture and individual water consumption and low flow (water quantity), reduce pollution (water quality),

Patrick: healthy watersheds that are in proper functioning condition including streams, water-balance approach is by far, the standard, fit-for-purpose approach for water use (recycle water in varying qualities in appropriate precincts), abandon zoning because it is at the core of the problem for the design process and cannot model sustainability on disintegrated constructs. Portland has 500 streets with no storm drainpipes. Run the business case – integrated design approach

Derek: no net runoff policy that encourages innovation of landowners to solve runoff issues using a decentralized, water balance model, reduces the reliance on public infrastructure. Need to manage pollutants on your site. Need to slow and treat your water before you release it (Performance standard).

Patrick: No, that is prescriptive. Need to have a way of measuring the stormwater runoff.

Sheryl: Yes, let's look at land based design indicators. Spacial.

Ted: Monitoring and maintaining the groundwater level to prevent depletion.

Patrick - The single greatest resource for food production is in the backyards of Metro Vancouver. The ALR is a jurisdictional policy that is not actually taking care of food production. It didn't address the issue of expropriation of value without compensating the farmers. It's really just zoning for one single use. It doesn't create value, it just forces a single economic use on the space, and if it doesn't work, too bad. Need a dynamic planning process take talk about synergies. Barnston Island example explained.

Hans – Growing up in Switzerland, surrounded by occupied territories, each family produced their own food on their own garden plots. To this day, they are still using the gardens. Links the elderly homeowners in Kitsilano with young apartment dweller who can grow the gardens. The most frustrating thing is that we know what to do but can't get everyone else to follow along.

Xenia – in order for metro Vancouver to be completely self-sustaining, we need 19 times the land base to feed everyone. Need to think of new ways of producing food (roofs, facades). Then if we are increasing food production, what does that mean for water?

Zo Ann - Water issue needs to have more power that drives other issues. Water is needed for the basics of nature. People still don't understand runoff and really managing it. We need renewed landscapes.

Sheryl – If we looked at the landscape through watershed boundaries instead of political boundaries people may feel more connected and responsible.

Sarah – distributed and decentralized systems are brilliant make water more visible. We manage our own water and celebrate it. What you can do at your own property, what you can do in the neighborhood…

Derek – taxpayer dollars going to non engineered conventional systems

Patrick – stock replacement. 2 sets of rules: 1 for private sector and another for government and institutions. Municipalities say "this doesn't apply to us" and that's a crock.

Derek – PFC is a universal standard that everyone can be held accountable for.

Kim – redevelopment creates the opportunity to get it right the second time

Hans – needs to prioritize actions to reach the vision. Strategy in the short term to reach the long term (get his list)

Patrick – ONLY resource recovery: the resources are energy and water. There is no waste. About to invest 5 billion dollar to replace outdated infrastructure and once you commit to it, you are stuck with it for at least 100 years.

Ted – Health does not want you to have the responsibility to treat your own water because of the risk. What is wrong with a boil water advisory? No one has died because of drinking water in Okanagan. Create a treatment system for each home that just treats drinking water.

Australia water and energy are brought to the property and then up to the individual – value is increased

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Harvest roofwater
Reduce impervious surfaces
Green roofs
Rain gardens
Wetlands
Buffer zones
Design areas for flooding – natural ecosystem functions
Agriculture efficient water use and management
Distributed sewage systems
Pollution source control
Energy and Water integration

Doing, Fostering and Enabling @ 3 scales:

Property (individual): house and garden
Neighborhood (municipality): roads, parking, commercial
Watershed (provincial): land use, forestry, agriculture, urban, etc.