

Guidelines for climate change adaptation in Canada's UNESCO Biosphere Reserves

A synthesis of the 2019 Climate Change Adaptation Forum

Bras d'Or Lake Biosphere Reserve, June 18-21, 2019, Baddeck, Unama'ki, Cape Breton, Nova Scotia.

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Executive Summary

Climate change is a reality that Canada's UNESCO Biosphere Reserves must adapt to. This adaptation is interlinked with sustainability, resilience, community building, and planning. All of these things are part of the ongoing operation of these UNESCO Biosphere Reserves. Recognizing disparate climate change related work amongst these reserves, members of the Bras d'Or Lake Biosphere Reserve decided to hold a three day Climate Change Adaptation Forum in June of 2019. The Forum was meant to bring together community members and organizers connected to one of Canada's 18 UNESCO Biosphere Reserves, and to facilitate a shared learning and collaboration. Specifically, it was intended to gather information on the threats faced by UNESCO Biosphere Reserves in Canada, and to try and come up with ideas for opportunities to plan and adapt to these threats.

There are a few outputs from the Forum. A number of videos have been produced to showcase the speakers and participants. Also, a detailed summary of proceedings report gives information on what was discussed, and synthesizes the many trains of thought that wove through the discussions. It was decided that another report should be created, one that proposes guidelines for climate change adaptation projects within UNESCO Biosphere Reserves in Canada, as well as for communities within those Biosphere Reserves. This is that report.

In this report we (the members of the Climate Change Adaptation Forum) propose seven guidelines for UNESCO Biosphere Reserves to internalize as they engage with the task of adapting to climate change in their area. These seven guidelines are:

1. Find your strengths.
2. Learn about your vulnerabilities and opportunities.
3. Use Two-Eyed Seeing (See the CEPI website¹ and the INFO BOX below for more information).
4. Promote local adaptation.
5. Learn from others.
6. Engage youth.
7. Consolidate and report.

To summarize these guidelines and to provide a quick reference, we have included a one-page poster with this report.

We have tried to distill the underlying themes that emerged from the Forum and to combine those with international best practices on adapting to climate change. Because of the wide audience, which is every Canadian UNESCO Biosphere Reserve, we have had to make the guidelines fairly abstract. We recognize, however, that many people at the Forum were intent on action but were unsure where to start. With this in mind we have included a couple suggestions for implementation following each guideline, as well as a set of concrete actions that could be undertaken immediately in order to get the ball rolling.

The Forum was filled with a spirit of shared action, of Two-Eyed Seeing, of empowering youth, and of coming to grips with how each member can contribute to the ongoing process of achieving sustainability through adaptation. Each UNESCO Biosphere Reserve has at its core a mission to help people live appropriately in place, to test new ways of interacting with their environment and new ways of developing their communities. Due to the magnitude of the changes in climate, adaptation to new environments will be a requirement both for communities within UNESCO Biosphere Reserves, as well as the ecosystems that they are integrated with. There is great hope, and great opportunity, for UNESCO Biosphere Reserves to engage in unique projects that elevate the message of adaptation through grassroots action. We hope these guidelines can be of some use in that effort.

- The CCAF *Ad-Hoc* committee. February, 2020.

Introduction

On a beautiful sunny day in June of 2019 a Climate Change Adaptation Forum (CCAF) took place. It was held at the Inverary Inn in the small town of Baddeck, Unama'ki (Cape Breton), Nova Scotia. This was a culmination of work by many people within the Bras d'Or Lake Biosphere Reserve Association and the Bras d'Or Lake Community Environmental Planning Initiative (CEPI). We, the committee members, hoped to bring together representatives from each of the 18 UNESCO Biosphere Reserves (UBRs) in Canada to discuss climate change adaptation. One of the suggested products from the CCAF was a set of guidelines for UBRs to implement or continue climate change adaptation projects. This report outlines those guidelines.

Climate change, even under the most optimistic scenarios, is inevitable.^{2,3} This scenario is particularly relevant in Canada. A national report authored by Natural Resources Canada concluded that “Canada’s climate is changing, with observed changes in air temperature, precipitation, snow and ice cover and other indicators. Further changes in climate are inevitable”.⁴ The temperature aspect of these changes made national news in 2019 when Canada’s Changing Climate Report stated that “Canada has warmed at roughly double the global average, and ... this warming is effectively irreversible.”³ Every day we are inundated with depressing facts of irreversible change and environmental degradation. These guidelines are meant to offer hope and foster action. They are meant to inspire small acts that, when brought together, can lead to a better future.

Sustainability is one of the central tenets upon which the Man-and-the-Biosphere Programme of UNESCO, and of UNESCO Biosphere Reserves (UBR), were founded upon. They “support policies that facilitate the development of sustainable livelihoods, allowing humans to meet their needs without compromising the needs of future generations.”⁵ Increasingly it is becoming obvious that a serious commitment to sustainability is impossible without addressing the need to adapt. UBRs are in an excellent position to plan for climate change adaptation because many of the underlying objectives of adaptation are already tangentially addressed through actions that are ongoing within UBRs. It is our thought that a consolidation and focusing of these efforts, alongside new efforts, could place UBRs in Canada in a place to truly test new and exciting means of adaptation.

Climate change adaptation is a thoughtful concept. It can be thought of as the “process of adjustment to actual or expected climate and its effects.”⁶ It is often thought of as a dual-edged sword: adaptation seeks to moderate or avoid harm, but also wants to embrace opportunities. Once a community identifies what impacts present the most risk they have two options to develop an adaptation strategy. They can increase their adaptive capacity, and they can reduce their vulnerability. These two options are closely connected, and often happen simultaneously. For example, a project that communicates alternative flood

protection measures for coastal property owners may result in some groups or individuals that adopt these measures, but will also build the capacity of the organization to communicate with community members and build a trusting relationship with them. An increase in the numbers of properties with flood protection measures will reduce overall vulnerability, and trust in communication and collaboration builds overall adaptive capacity.

Of particular interest to UBRs is the demonstration that in natural systems, careful human intervention can benefit species adaptation to changing climate². For human communities within UBRs seeking futures steeped in interconnectedness with nature, such stewardship is central to their success. This means that adaptation projects are not all about individual actions such as the installation of solar panels on your roof. This means that a community led cleanup and protection of a known bird nesting habitat would give the birds better capacity to adapt to their changing environment. Adaptation to climate change is intimately connected to the shared sustainability of communities and the ecosystems that they live in. Living “appropriately in place”⁵ requires an understanding of how that place is changing, what role we are playing in causing that change, and how we can adapt to that change.

Climate change adaptation planning helps organizations identify threats and opportunities resulting from climate change.⁶ This planning seems to work best when it is an “iterative risk management process”,² meaning that it is repeated a number of times before you get it right. This also means, however, that you can start small and build and refine each time you repeat. From this planning cycle comes projects that spawn from ideas generated during the process. For the purposes of these guidelines we’ve made some assumptions. The first is that projects are the products of planning. While the plan outlines the principles, the projects implement those principles in the UBR. They give life to ideas. The second is that the notion of a project does not always appropriately describe actions. Sometimes there are a sequence of different but connected small projects, but which are all loosely connected by a theme. We will call these longer-term and fluid actions “initiatives”. For example, a “sustainable gardening initiative” might be a workshop on seed banks one year, a greenhouse raising project in a public space the next year, and so on. Both, however, will be under the same initiative. And so, a collection of projects and initiatives carried out using an adaptation plan we will call a program. With these guidelines we hope that every UBR in Canada can begin or strengthen their climate change adaptation program.

According to the CBRA’s “Learning Together” document of 2019: “behind each [UNESCO] Biosphere Reserve site, there is a convener organization that develops, implements, manages, and coordinates the initiatives that catalyze the ... mandate [of the Biosphere Reserve].”⁵ It is for these organizations, as well as for the communities within and adjacent to UBRs, that these guidelines were written. It is also important to acknowledge the diversity of governance structures within Canada’s UBRs. There

is no enforced structure to these NGOs and their boards of directors. Some are fairly well funded, others are cash strapped. The one thing that unites them is the conviction that living appropriately in place is fundamentally sustainable.⁷ The CCAF revealed varying levels of engagement with climate change adaptation planning among the UBRs, but also an overwhelming thirst for guidance to take actions, both big and small. These guidelines are written for these conveners of BRs as well as for the communities within and adjacent to UBRs, so that they can begin to plan for climate change.

Any number of things can go wrong during the process of developing an adaptation plan, but research is growing on what works and what does not work. These guidelines are meant to distill these best practices into general guidance that can be used by UBRs and communities to support adaptation in their UBR.

Climate Change Adaptation Forum

The Climate Change Adaptation Forum (CCAF), a gathering of 67 participants from 16 UBRs across Canada, took place on the shores of the Bras d'Or Lake Biosphere Reserve, in the Town of Baddeck and Wagmatcook First Nation, Unama'ki (Cape Breton), Nova Scotia.¹ Over two and a half days this diverse group assembled to discuss past, ongoing, and future adaptations to climate change in Canada's UBRs. It was clear from the Forum that many of those involved in UBRs want to take action to adapt to climate change, but were unsure where to begin.

The overall sense was that UBRs are poised to engage in climate change adaptation within their regions, but lack a unified direction and are worried about competing risks, to the point that adaptation action has not materialized. The CCAF outcomes include a video recording and document of proceedings, an attendees questionnaire, as well as these guidelines.

A questionnaire was sent out following the CCAF, in which participants were asked to reflect on their experience at the Forum and within their UBR. The response rate was quite low (12 out of 68 sent out: 17.6%), and skewed to the Bras d'Or Lake Biosphere Reserve (5 out 12 responses: 58%), but includes input from the Georgian Bay BR, the Long Point BR, the Frontenac Arch BR, the Clayoquot Sound BR, as well as the organizing group from the Magdalen Islands. Also included is one response from a youth representative. Despite these issues, the results capture some of the generalizations that arose at the Forum:

1. There is currently very little climate change adaptation planning ongoing within Canadian Biosphere Reserves. This is not to say that adaptation or planning is not happening in any UBRs.

¹We encourage to watch the welcoming remarks by Rebecca Hurwitz and Albert Marshall at this link: <https://youtu.be/U6trAG7W4tE?t=1997>

In fact there was evidence of some great current work, but in most cases they were not explicitly related to adaptation. Those that were in direct response to changes in regional climate were the minority. Due to the mandate and actions of UBRs, it is very likely many current projects would quite easily fit under the adaptation umbrella, but are not specifically called adaptation, and not part of an adaptation program.

2. Respondents generally felt that the CCAF was a valuable exercise. This is expected, since respondents are skewed to the Bras d'Or Lake BR, but it is given some weight because it agrees with one of the action items that came from the CCAF. Specifically, the idea that workshops similar to the CCAF could be held in other BRs with a more regional and local focus. Furthermore, the Parks Canada format described in Garrett Mombourquette's presentation to the CCAF² (and outlined in a new report⁸), could be used as a template.
3. Responses suggested that limited financial resources are the primary constraint for many UBR organizations. This is not true for all of Canada's UBRs, but certainly for many. We were mindful of constrained resources during the drafting of these guidelines, but given the public concern for climate change, there are opportunities to mobilize immense social and communal resources.
4. Lastly, and perhaps surprisingly, there was little consistency among respondents about the key items to be taken away from the Forum. Each respondent was asked to choose three key elements from a large list produced by the CCAF that they felt were required for adaptation in their UBR. There was very little agreement about what these key items were. Because the potential list was so varied, we decided to categorize the responses into themes that connected them. The graph below shows that the respondents identified "outreach and communication" as the most essential element of adaptation in UBRs. This, however, was closely followed by a "better understanding of vulnerabilities", as well as "internal coordination" and to "promote an enlightened ontology", which was about changing the way people think and act in relation to their environment (Figure 1).

Overall the CCAF emphasized a will to act. It also highlighted a number of great initiatives currently underway, signalled the importance and enthusiasm for engaging indigenous peoples in BRs, and called for greater youth engagement through the entire process. We hope that these guidelines, coupled with the other outputs from the Forum, can be the first step in the road to promoting climate change adaptation within Canadian UBRs.

²For the full presentation by Garrett Mombourquette for the CCAF, see this link: <https://youtu.be/U6trAG7W4tE?t=3574>

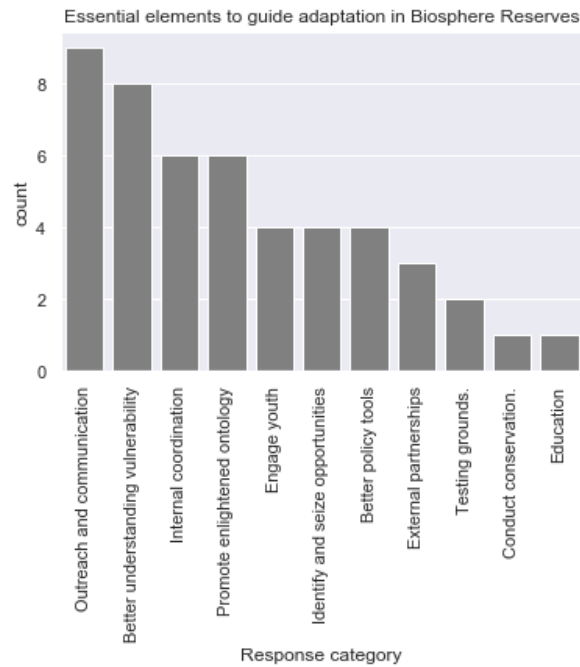


Figure 1: Each respondent was given the opportunity to choose 3-5 essential elements from the proceedings document. The result of these choices were then categorized into themes, which are plotted in this graph.

Climate Change Adaptation in Canada's Biosphere Reserves

Biosphere Reserves have in their core mandate a commitment to promote best practices for sustainable development, and adaptation planning is fundamentally linked to sustainable development. Though not officially required by the review process of UNESCO's Biosphere Reserve periodic review process (last revised in 2013), climate change adaptation is arguably a fundamental part of UNESCO's Man and the Biosphere (MAB) program. In directly dealing with sustainability, UBRs are faced with the challenge of sustaining communities and ecosystems in the face of dramatic climate change. In doing so, they will be adapting either directly or indirectly. Dealing with it directly will likely reduce the chances of maladaptation, which is when things that are meant to help reduce harm in fact exacerbate it.

The research on climate change adaptation planning is a bit grim. We actually have little documented evidence of successful adaptation. How can this be with so much money and motivation? Mimura (2014),⁹ in a review of the case-studies, identified two main reasons. The first is a failure to overcome resource and organizational constraints. That is, the plan was formed, but competing priorities meant that its implementation was not realized. The second is that the design of adaptation projects tended to discount long and medium term initiatives, and instead work on short-term ones. It is our hope that this guideline might help avoid these pitfalls. The first is clearly dealt with by setting out resource and

organizational constraints at the beginning, and the second may be dealt with as an additive product of continued, small successes. Iterative scoping for smaller projects that contribute to a long-term goal, rather than attempting large scale endeavours, may provide the motivation and unity required for long-term viability.

The impacts of climate change are geographically diverse³. Spread across 18 UBRs, impacts and vulnerabilities are varied. Generalizing among geographically separated ecosystems can undermine adaptation planning. For example, due to the lifting of certain lands after the last deglaciation, there are a number of communities in Canada that are experiencing sea-level fall. So even assuming an exposure as wide scale as sea-level change risks failing to account for local exposure. The CCAF made it clear that the 18 UBRs in Canada are facing distinct socioeconomic and biodiversity challenges based on their unique geography.⁷ Canada's Changing Climate Report³ supports this conclusion, demonstrating that while some parts of the country have cooled, others have warmed at almost three times the global average. The CCAF attendees made it clear that local exposure to climate change effects in Canada are a mixture of chronic and acute stressors, that some local challenges are global in scope, and that many are connected to a loss of biodiversity. Furthermore, adaptive capacity is limited by an urgent need for "cognitive rewiring" (See Tom Johnson's presentation on page 13 in the CCAF proceedings⁷), and governance structures that are currently inadequate.⁷ The challenges are great, but gaining a holistic understanding of the main drivers of these challenges is the first step.

The time scales of impacts are important, and can vary considerably. Furthermore, a present bias can warp priorities and cause maladaptation or missed opportunities. Maladaptation happens when actions are taken that are supposed to increase adaptive capacity, but instead erode it. This is often due to a poor initial assessment of vulnerability or adaptive capacity.¹⁰ An example is the injudicious use of nurseries to bolster declining fish stocks. If new stock is added without consideration of the overall impact to connected species and ecosystem function, then the introduced stock could actually undermine the overall adaptive capacity of the ecosystem. This effect is brought on by a poor understanding of the systems adaptive capacity (See this paper¹¹ for more examples). The ability to look past short term solutions and identify holistic solutions is a key part of the struggle to adapt.⁹ It is our hope that these guidelines can help produce adaptation plans that lead UBRs into the future.

³Robert Muggah's presentation to the CCAF highlighted the geographic diversity of threats faced by Canadian UBRs. Please see the video of that presentation here: <https://youtu.be/U6trAG7W4tE?t=11591>

Intended Users of the Guidelines

These guidelines are meant to provide high level guidance to UBR governing bodies in Canada, as well as to communities of people living within or adjacent to UBRs. The goal is for these governing bodies to use these guidelines to create a climate change adaptation plan for their UBR, and then start to support projects that follow this plan. It is our hope that these guidelines be adopted by governing bodies of UBRs across Canada, and that they can begin the process of producing, through internal action or with significant external collaboration, an adaptation plan for their UBR or their community.

Intended Uses of the Guidelines

These guidelines are meant to provide practical ideas and general guidelines on how to undertake projects and initiatives within UBRs that build their adaptive capacity. These guidelines are meant to act as a reference for the governing bodies of UBRs and for communities as they make decisions on what adaptation actions to take. Currently Canadian UBRs are not required to produce adaptation plans as part of the periodic review process, but this will likely change in the future. We recognize the immense challenges faced by UBR organizations in Canada concerning finances, time commitments, jurisdiction, and other constraints. Consequently, the guidelines are flexible enough to facilitate specific actions that make a small difference, but also broad actions that set the course for a UBR to fully embrace the risks and opportunities that climate change presents.

It is imperative that UBR leaders and residents not dwell on the magnitude of the issue as an excuse for inaction. These guidelines can fit on a single piece of paper, and the actions they are meant to inspire can be small or large. A careful and slow adoption of well thought out actions is likely to be more sustainable anyway, as opposed to a grand gesture of transformation. A climate change adaptation plan, if in existence, is a small letter of intent that can last longer than any individual UBR board member or committee, and potentially support long lasting actions. These guidelines are meant to help.

The overwhelming consensus is that a climate change adaptation plan, a single document outlining the vision and strategy of a UBR for addressing the risks and opportunities of climate change, is the best possible means of implementing these guidelines. Any infusion, however, of the guidelines into ongoing or upcoming projects within a UBR would represent building adaptive capacity, and therefore be beneficial. With that in mind know that the ideal is to create an adaptation plan specific to your UBR, but that consideration of the guidelines in your ongoing actions, projects, and review processes is a desirable outcome as well.

This report includes a one-page summary poster. Please distribute this poster to your UBR network

for reference.

Structure of the guidelines

This report distills the conclusions of the CCAF, mixes in best practices from the climate change adaptation literature, and proposes seven guidelines for adaptation planning in Canadian UBRs. A pamphlet associated with this report is meant to provide quick reference to the seven guidelines. This longer report provides the background for the seven guidelines, as well as justification for their inclusion. Lastly, following each guideline, we provide a list of implementation steps or concrete actions that can be undertaken related to that guideline.

Info Boxes

These guidelines have a number of small informational boxes scattered throughout. These are meant to solidify abstract concepts as they are presented, as well as highlight examples of ongoing work in Canadian UBRs related to sustainability.

Glossary of terms

This glossary is adapted from the IPCC glossary,² as well as the abridged glossary from the ISO standard on adaptation to climate change.⁶ We have reworded the descriptions, but not changed the underlying meaning of each term. It is really important as more and more conversations happen around the topic of climate change and adaptation that we can agree on a common set of words and meanings so that we know we are talking about the same things.

1. Adaptation to Climate Change

The process of adjustment to actual or expected climate and its effects. Within communities, adaptation seeks to moderate or avoid harm and to take advantage of beneficial opportunities. Within ecosystems, careful human intervention can help the adaptation of species and ecological communities to the new climate. A community adapts by limiting new development in areas expected to flood with sea-level rise, thereby avoiding adding to their vulnerability. Conservation of suitable spots for salmon to spawn in managed rivers would be an example of human intervention.

2. Adaptive Capacity

The ability of organisms and communities to adjust to damage, to take advantage of opportunities, and to respond to the consequences of climate change. This is a large and complicated idea, but really comes down to whether the community or organization has the resources required to reduce its vulnerability, and therefore adapt.

3. Adaptive Management

The management of an iterative cycle of planning, implementing, and reflecting on adaptation projects. There are two main things to remember. It is iterative, so you repeat the cycle many times as information changes. Also, it has to use what it learned from the past cycle to help improve the outcomes of the current cycle. The end goal of iterative management is to have an ongoing process that is low enough in maintenance cost to be sustainable, but that is recent enough to be relevant as new challenges are faced.

4. Climate

A statistical description of weather in terms of the mean and variability of relevant quantities (for example temperature, precipitation, or wind) over a period of time ranging from months to thousands or millions of years. This is traditionally done over 30 year time spans, often referred to as the “climate normal”.

5. Climate Change

Change in climate that persists for an extended period, typically decades or longer. Climate change is caused by many things, but there is now widespread agreement that human greenhouse gas input to the atmosphere is the primary driver of current observed changes in global climate.

6. Exposure

The presence of people, communities, animals, or plants, in places and settings that could be affected. Exposure can change over time, for example as a result of changes in land use.

7. Hazard

A potential source of harm. Hazards can be slow or fast in their onset. They can be a source of harm to communities, infrastructure, livelihoods, plants, animals, their habitats, or entire ecosystems.

8. Impact

An effect on ecosystems or communities caused by extreme weather, climate events, or climate change. For example, an *impact* of sea-level rise on coastal communities is *increased flooding*.

9. Indicator

A quantitative or qualitative variable that can be measured or described, in response to a defined criterion. For example, changes in the first appearance of leaves and blooms in plants are an indicator of changing air temperatures.

10. Risk

The effect of uncertainty. An effect is a deviation from the expected. It can be good, bad, or neutral. Uncertainty is what you have when you don't know enough about an event, its likelihood, or its consequences.

11. Sustainability

The state of being in which the needs of the present are met without compromising the ability of future generations to meet their own needs. The environmental, the social, and the economic aspects interact with each other, and are widely known as the three dimensions of sustainability.

12. Vulnerability

A propensity or predisposition to be adversely affected. Vulnerability is a big idea, and includes sensitivity, risk, resilience, and adaptive capacity. It brings them all together. Sensitivity to expected change, risk of exposure due to uncertainty, the resilience of the communities affected, and the capacity for those communities to adapt to the expected change. All together these factors combine to form the vulnerability of those communities to current or expected change.

The Guidelines

Now we come to the actual guidelines, of which there are seven:

1. Find your strengths - where a biosphere comes to terms with the resources it has to use in planning adaptation projects.
2. Learn about your vulnerabilities and opportunities - where a biosphere gains the information and knowledge required for effective adaptation projects.
3. Use Two-eyed Seeing - where a biosphere engages the wisdom of how to act responsibly. By using both the sources of knowledge from Western science and from Indigenous knowledge to harness many sources of strength to adapt in the face of change.
4. Promote local adaptation - where a biosphere searches out community partners with which an alliance is formed and the actions of the group are better than those done alone.
5. Learn from others - where a biosphere draws on the wealth of experience within the world UN MAB Network, as well as the ideas gaining traction as other communities learn to adapt.

6. Engage youth - where a biosphere helps its youth to envision a future within their community, helps empower them to act, and helps to build a bridge to the natural world.
7. Consolidate and report - where a biosphere takes what it has learned and synthesizes it into stories and lessons, which can be found and shared with others. To build a knowledge base of how to adapt and “live appropriately in place” within the UBR.

It is important to again stress that each guideline is meant to facilitate further action, and not to prescribe or prioritize specific intentions. The hardest part of creating guidelines is to make them specific enough to inspire a local action, but general enough to be applicable in a range of circumstances. We hope that we have found a reasonable balance.

1. Find your strengths

This guideline is about pre-planning. It is about identifying the resources and opportunities that are going to help you create a sustainable plan and a successful program. It facilitates all further actions and initiatives. This is often called “scoping”, and is really about determining the limits of the upcoming project. This is helpful not because it provides an excuse for inaction, but because it realistically sets limitations⁶. This process helps later decisions about what is “in scope” for the project, and what is outside the realm of possibility, thus increasing the chances of success.⁶ Though it may seem that resources are too tight to do anything, taking stock of your strengths empowers small actions that may be currently constrained, but could gain momentum and draw more resources. With a problem as large as climate change, and the inherent constraints faced by UBR directors, this guideline is important. The temptation to want to solve a huge problem with minimal resources is ever present, but under such constraints it is crucial that resources are efficiently used. This requires an honest assessment of what is possible, and perhaps solidifies the need for partnerships and regional cooperation.

In this process you will assess your adaptive capacity. Assessing adaptive capacity requires you to assess your:

1. Financial resources
2. People power and external networks
3. Technical know-how
4. Other organizational resources

This guideline is included as a “crucial step” by the latest ISO standard on climate change adaptation⁶. A survey of 377 professions conducting adaptation planning within varied organizations by the Association

of Climate Change Officers identified the greatest barriers to successful plans and projects. They broke these difficulties down into three topics: understanding climate change in their area, planning for those changes, and managing the actions undertaken according to plan. As may be expected, the greatest challenges came from managing. Planning was second in difficulty, followed by understanding the problem.¹² It may not be surprising to hear how difficulties arose for others, but keep these challenges in mind when allocating planning efforts. Know that significant challenges are often encountered while implementing the planned actions.

1.a. INFO BOX: The role of regulatory authority in adaptation planning: a case study of the Niagara Escarpment planning commission.

During the CCAF John Stuart gave a presentation on the Niagara Escarpment Commission. The Niagara Escarpment Commission is the convener of the Niagara Escarpment Biosphere Reserve (NEBR), and has regulatory authority within the UBR. This is a unique situation in Canada's UBRs. Most UBR directors have no regulatory authority, but can be strong advocates⁴.

Implementation:

1. Honestly assess the resources that are available to produce a climate change adaptation plan.
 - a. Is the leadership there within the board, or are there community partners that are better positioned to guide it?
 - b. What roles and responsibilities are needed to get going? Who will be in which roles?
2. Identify partner organizations that are either actively adapting to climate change, or could provide resources to do so. This could include all levels of government, community and conservation groups, professional associations, or other organizations in your region.
3. Document findings concerning institutional capabilities and potential partners. Write up the results of the discussion and put it in a place where it can easily be accessed.
4. Engage partner organizations by reaching out and outlining your goals and whether they could support the initiative, or whether you could support one of theirs that meets your intent.

⁴John Stuart's response on his experience using municipal zoning as a means of adaptation can be found here: <https://youtu.be/DfGcm9Ila7k?t=4788>

2. Learn about your vulnerabilities and opportunities

An assessment of impacts and vulnerability is crucial to all further work in adaptation planning. Success in adaptation is largely a function of either enhancing adaptive capacity or reducing vulnerability.¹³ Without at least a rough look at vulnerability, you won't know if what you're doing is working.

Identifying opportunities is part of adaptation planning.⁶ It is not just about opportunistic thinking, but about doing your best to go from a reactive approach to an anticipatory approach, which is often better. Opportunities empower the organization in a number of ways. Though a hard goal to achieve, it is widely reported that such a shift from reactionary responses would “help reduce social and economic costs, increase efficiency and further reduce vulnerability in Canada.”¹⁴ In Doug Foster's presentation to the CCAF he highlighted his experience “using the crisis”, or identifying opportune times to initiate a project so that it is well timed with other events and therefore gets immense support.⁵ So opportunities are not only about the good, but knowing when to engage with the bad. Related to this was the presentation to the CCAF by Garrett Mombourquette from Parks Canada. In it he makes the point that past events ground the discussion of future risk.⁷ In other words, planning a project around mitigating shoreline erosion is best received and supported by a community after a severely disruptive storm season.

As stewards of UBRs, there is a wealth of opportunity to establish, or use existing “living laboratories” within UBRs. These “climate monitoring initiatives” are an increasingly important part of the mandate of some Canadian UBRs, and this role is likely to increase in importance in the future.⁵ The potential opportunity to engage universities, citizen scientists, and government bodies in UBR initiatives is by far the most common reported advantage of UBRs in adapting to climate change.⁷ We argue that this represents only a fraction of the opportunities presented.

Implementation:

1. Create an impact assessment and a vulnerability assessment for your UBR.

Though at first glance this seems like a daunting task, we argue that it is not. An impact assessment can be small, simply stating the expected impacts of climate change within the UBR. It could go as far as to provide evidence of these impacts. This seems like an excellent opportunity to engage with universities and community colleges in order to provide tailored impact assessments for UBRs.

An impact assessment is just a list of the impacts of climate change that the UBR is most exposed

⁵Doug Foster's presentation to the CCAF highlighted the need to capitalize on timing: <https://youtu.be/DfGcm9lla7k?t=3844>. The presentation material can be found in the proceedings⁷.

to. These can include sea-level rise, increased forest fire occurrences, loss of economic prospects due to increased drought, etc. At this point only the impact is identified, but not its ability to challenge the sustainability of the communities within the UBR, the latter being a vulnerability assessment. Given the identified impacts, how vulnerable are the communities to these impacts? This is related to their sensitivity, their exposure, their risk, and their adaptive capacity. Without diminishing the size of this task, we want to reaffirm that these assessments need only be based on the *best available information* using the *available resources*, and so can be scaled according to these constraints. Data scarcity is a constant problem, but should not be used as an excuse to not create an impact and vulnerability assessment. The iterative process takes care of current constraints, and starts the ball rolling. Start now, and perfect later.

2. Document opportunities found, and include them in the assessment of vulnerability as a source of potential adaptive capacity. Be sure to follow up on these opportunities when it comes time to design or plan a specific project.
3. Keep these assessments alongside the adaptation plan, to be appended as new information comes in⁶.
4. Host a regional workshop to identify local capacity and vulnerability. Research has shown that top-down prescribed vulnerability rarely engages the local communities to adopt adaptation projects. Instead, a bottom-up approach where priorities are locally derived consistently produces more adaptive and sustainable planning for communities, especially vulnerable communities.¹⁵ An entire realm of practice has emerged to encompass this top down approach: Community-based Adaptation (CbA)¹⁵. A possible template for this was presented by Garrett Mombourquette at the CCAF⁷, and reported on in a new report⁸.

2.a. INFO BOX: Climate Information Services.

Climate information services refers to a suite of products that gather and summarize a range of information sources to provide managers and organizations locally relevant projections of climate change impacts. It is increasingly handled by national governments, but these services can also be contracted from private companies or NGOs. The rapid growth and professionalization of this domain is due to increasing demand for locally relevant information on which to base adaptation decisions.

⁶Brian Ilnicki from the Beaver Hills Biosphere Reserve did an excellent job of breaking down the impact assessments associated with temperature and precipitation trends in the region. See his presentation here: <https://youtu.be/DfGcm9Ila7k?t=10242>

This is an excellent opportunity for partnership with universities, who generally have the experience and desire to create data products for conservation groups. Often this can form the basis of a thesis proposal (See for example this proposal online¹⁶). Climate information services, as a down-scaling of national climate projections, or as a literature review of expected climate change impacts within a region, make for excellent projects for students. Additionally, Canada's national climate information service (<https://climatedata.ca/>), provincial services (<http://lamps.math.yorku.ca/OntarioClimate/>), and regional research groups (e.g. <https://www.pacificclimate.org>), are valuable resources.

3. Use Two-Eyed Seeing

The idea of Two-eyed Seeing, or finding ways to use both Indigenous and Western points of view to find benefit for all (see INFO BOX on Two-eyed Seeing below), is an idea that can help sustain UBRs, and is therefore an adaptive one. It was an idea that permeated the entire CCAF, and that was drawn on again and again to root further action. In the spirit of collaboration, to use two-eyed seeing is to hold multiple and sometimes at-odds worldviews in equal footing. To use them to make better plans and to make better projects.

The literature is unequivocal: adaptation that does not engage all interested parties will likely fail.² UBRs in Canada are actively pursuing reconciliation and many Indigenous and non-Indigenous people live within or adjacent to UBRs. This was echoed by Garrett Mombourquette in his presentation, in which he stated the need to engage multiple sources of knowledge and multiple ways of knowing in order to meaningfully adapt.⁷

There is a fundamental overlap between Indigenous ways of knowing and the mandate of Canada's UBRs. Sustainable development within UBRs requires an ecocentric worldview to be effective. In a 2013 report Stan Boychuk, chair of the Canadian Man in the Biosphere (MAB) committee, said that "every Biosphere has as its greatest task, the educating of its citizens in living appropriately in"place". The link between place and people is our connection to who we are as a people. The Nuu-chah-nulth of the west coast on Vancouver Island call this concept 'haholthie', our sacred trust."¹⁷ A similar concept is embodied in the Mi'kmaw concept of Netukulink, which roughly translates to "sustainability" (literally "to avoid not having enough").¹⁸ A notion highlighted by elder Albert Marshall at the CCAF was "ecological integrity", and the priority of "biodiversity" in conducting our shared actions.⁷ These three threads weave a story that clearly embraces all ways of knowing in coming up with beneficial projects that may make UBRs more prepared to handle expected changes in their climate.

Two-eyed Seeing is, to some extent, already integrated into the operation of some of Canada's UBRs. For example, the Mi'kmaw-managed Collaborative Environmental Planning Initiative (CEPI), the operational partner of the Bras D'Or Lake Biosphere Reserve Association (BLBRA), integrates the principles of Two-Eyed Seeing into its work.¹ This approach to governance is captured in a guiding document entitled "The Spririt of the Lakes Speaks".¹ The shared journey among the Indigenous and non-Indigenous residents of the Bras D'Or lakes builds a shared future, one with a closer connection to nature and to the Creator.¹⁹ This, in turn, builds resilience and strong networks. From this comes a greater adaptive capacity for the people and ecosystems within the UBR.

3.a. INFO BOX: Two-eyed seeing

Mi'kmaw Elder Albert Marshall is credited with creating and promoting the idea of "Two-eyed Seeing", or "Etuaptmunk" in Mi'kmaq. It refers to "learning to see from one eye with the *strengths* of Indigenous knowledge and ways of knowing, and from the other eye with the *strengths* of Western knowledge and ways of knowing and to using both these eyes together, for the benefit of all."²⁰ This passionate call to shared understanding and action, is meant to be a guiding principle of integrative and collaborative work for the twenty-first century. To be successful, the group must work with mutual respect to "develop of a living knowledge of collaboration."²⁰ In practice this is hard, and requires a weaving back and forth between these alternative ways of knowing, an adoption of humility in the face holistic problems, and a patience for the pace of a long and shared co-learning journey.

For further information on the adoption of Two-eyed Seeing in various capacities we encourage you to learn more here: <http://www.integrativescience.ca/Principles/TwoEyedSeeing/>

Implementation:

1. UBRs are pieces of Mother Earth where our efforts to live sustainably are showcased. Stewardship of these places should be a collaborative effort among all people. The involvement of the Indigenous inhabitants and stakeholders is crucial so the administrative bodies (boards, committees) need to be welcoming spaces for inter-cultural collaboration. Reach out to the Indigenous Circle within the Canadian Biosphere Reserves Association (CBRA) to ask for guidance to make these spaces conducive to this collaboration.

2. Establish an Indigenous working group in your UBR to respectfully recognize the voice of the people what have always been part of the land. Striving always to keep a respectful partnership between all members of the UBR, this working group can suggest ways to further this goal and ways to help make sure all voices get heard.
3. Learn about Indigenous models of governance and land stewardship, such as the principle of Netukulimk (Mi'kmaq concept related to sustainability, or literally “to avoid not having enough”), or the Great Way of Peace: Respect, Equity, and Empowerment.²¹ Explore ways of incorporating these governance models into the functioning of the UBR.
4. Invite an Indigenous community member to work within a project initiated under the climate change adaptation plan. Often there is a wealth of local ecological knowledge around recent changes in the environment and the climate. This local knowledge could enrich the project and help to build meaningful relationships.

4. Promote Local Adaptation

Because climate change is already happening in many parts of Canada, and some of its effects are already being felt by communities, there are already many levels of climate change adaptation planning happening. These are happening at federal levels, at provincial levels, at municipal levels, at community levels, and at personal levels.¹⁴ As UBRs are financially constrained, the ability and skills required to partner with other organizations should be considered important.

Fostering partnerships with local organizations is a fundamental part of building resilient communities and developing sustainable adaptation plans. Success is largely determined by how well the plan integrates into already existing projects within the community or region. In a landmark paper describing vulnerability and adaptation of communities to climate change, Smit (et al. 2006)²² stated “vulnerability reduction appears to be most effective if undertaken in combination with other strategies and plans at various levels.” In the climate change adaptation practitioner brief of an international NGO (the manual that workers use when helping communities administer adaptation projects) makes it clear: “the sustainability of adaptation projects is directly linked to the extent to which they integrate into already operating projects or initiatives, regardless of the motivation of those partnering projects.”²³ This emphasis on “networks”, or relationships between communities and individuals, is a core principle of resilient communities, and it is one that was emphasized repeatedly in the CCAF. The participants highlighted the potential for partnerships, and the importance of building strong regional networks within the UBRs.⁷ In Jennifer Dingman’s presentation she highlighted the work of the Fundy UBR, and in particular the importance of strengthening community through conservation and outreach.⁷

Though UBRs do not have financial (and in most cases regulatory) power, they are arms of an international community of more than 700 UBRs, and hence the potential to amplify the messages of local adaptation initiatives. UBRs receive no core funding from the UNESCO, CC-UNESCO, or from the Government of Canada.²⁴ These organizations, however, will fund projects. This could be a bargaining chip in building networks of partners to propose adaptation projects within UBRs.

Beyond being strategic partners in applying for funding, UBRs are well poised to amplify the message of a partnership or network and to bring the story to a wider audience. In this idea we think the UBRs have great potential. At the CCAF Jennifer Dingman presented the “Whitney Journals Documentary⁷”, a short film telling the story of the Whitney family in the Fundy UBR. The family had a long and continuous weather record for their farm, which serves as, given the personal, engaging format, a powerful outreach tool used to further understanding of climatic changes within the region. This communication piece amplifies the efforts of those involved with the project, and brings attention to grassroots movements²⁵. The role of UBRs as an accelerant when engaging in partnership projects was emphasized by John Stuart of the Niagara Escarpment Commission in his address to the Forum. His experience has convinced him that UBRs are uniquely positioned to catalyze grassroots movements.⁷ Norm Ruttan, a long time member of the Frontenac Arch UBR, said in an interview in 2004 that the success of a UBR rested on two critical points. The first is the extent to which it can empower grassroots movements engaged with federal and international partnerships. The second is the degree to which it can unify a disparate conservation and landscape planning region. In other words, the extent to which it can become a “chamber of conservation and sustainability”, so that all of the small interested groups in a region have a place to come together, and unite as a common voice for local communities.²⁶ As a chamber of sustainability, it must now commit to uniting a voice for climate change adaptation. The success of climate change adaptation within UBRs will be closely connected to how well they integrate with ongoing initiatives. The role of UBR’s should be to empower and amplify local grassroots movements, and to provide guidance on how best to adapt.

4.a. INFO BOX: The Collaborative Environmental Planning Initiative (CEPI) - a model for community engagement.

The CCAF highlighted the CEPI in many ways, but particularly recognized its youth engagement, its underlying model of functioning, and its tackling of multiple issues. This model could be used in other UBRs. In his address to the CCAF Senator Dan Christmas emphasized the importance of

⁷Jennifer Dingman presented on the Whitney Journals at the CCAF. See it here: <https://youtu.be/DfGcm9Ila7k?t=9662>

CEPI's inclusive and collaborative approach to address problems in a holistic way⁸. The CEPI is tasked with creating a management plan for the Bras D'Or Lakes, and is collaborative across Mi'kmaq communities (the Indigenous peoples of the area), municipal, provincial, and federal regulators. But more importantly, its charter is collaborative in the spirit of Two-eyed Seeing: "one eye on our past history and teachings, and one eye on modern science."¹

Implementation:

1. Once local groups that are active or potentially interested in climate change actions have been identified (See "Find your strengths"), it is important to reach out to them. This may be in the form of offering to amplify their message into the UBR network across Canada, and perhaps the world. Or it could be with a proposal for a small project or initiative that they would consider contributing to. If it is a local not-for-profit interested in stream restoration, perhaps there is a chance collaborate on restoring a stream within the UBR.
2. There are climate champions in all communities across Canada, and within UBRs their messages can be spread by the UBR organization. Their message could be directly in line with the UBR's mandate. It is more cost effective to gather information regarding ongoing adaptation, and then to spread that to allied groups within your network.

5. Learn from others

A UBR is a local testing ground for big ideas. This is both fundamental to UBRs, as well as a documented predictor of successful adaptation. The ability to test at a small scale new and innovative ideas of how to organize a community represents a huge opportunity for UBRs to embrace one of their core principles, as well as to initiate good adaptation projects. In his summary of current and future adaptation within Canada, Burton (2008)¹⁴ identified reviewing and contributing to international initiatives as one the four main paths to move climate change adaptation forward in Canada. UBRs are already half way there. In the words of the Canadian Biosphere Reserves Association (CBRA): "Biosphere Reserves implement global agreements at the local level, including the United Nations Framework Convention on Climate Change (UNFCCC)."⁵ The LIMA Action plan provides a context for borrowing grand ideas. It asks UBRs to "develop and strengthen models for sustainable development", to "help Member States and stakeholders to urgently meet the Sustainable Development Goals through experiences from the World Network of Biosphere Reserves (WNBR), in particular through exploring

⁸For a full explanation of this strategy, see Senator Christmas's presentation here: <https://youtu.be/U6trAG7W4tE?t=8230>

and testing policies, technologies and innovations for the sustainable management of biodiversity and natural resources and mitigation and adaptation to climate change.”²⁷ A large part of being a successful UBR is in thinking globally and acting locally.

The idea of natural infrastructure (see info box 5.a. below) as a basis of adaptation is increasingly being researched, and UBRs stand to gain from local implementation. Accounting for the natural infrastructure in the UBR puts it in a good position to argue their necessity to local government or to development pressures. Natural infrastructure is connected to the idea of ecosystem services, whereby we value the services that functional ecosystems provide to humans.²⁸ As stewards of functioning ecosystems that are integrated with communities of people, UBRs could be at the forefront of this burgeoning adaptation movement. For a long time ecosystems have been spiritually important for people, but this has not stopped their degradation and in some cases, destruction. Perhaps an honest accounting of their services in more practical terms would make UBRs more sustainable. Certainly the international community is increasingly going down this road.² The International Union for the Conservation of Nature (IUCN) put out a report in 2009 on “Ecosystem-based adaptation” (EbA). They highlighted examples from around the world where communities acknowledged the ecosystem services being provided by their environment and were using this understanding to reduce their vulnerability.²⁹ Indeed, more recently, a report stated that any climate change adaptation within UBRs should focus primarily on ecosystem services.³⁰ These ongoing international conversations provide ample sources of inspiration and technical implementation details that can be applied in your community or UBR.

Implementation

1. Approach a researcher that is researching ecosystem-based adaptation, or nature-based solutions, or natural infrastructure. Suggest that the UBR could sponsor a grant application looking at the natural infrastructure or ecosystem services of the UBR.
2. Outdoor education has been shown to enhance the connectedness of youth to the natural world, which is a builder of adaptive capacity. With this in mind, collaborate with local schools to have a day outdoors in your UBR interacting with the natural world.
3. Use one of the practitioner guides to community-based adaptation to plan a project in your community (See Nyandiga *et. al.* (2015)¹⁵).

INFO BOX: 5.a. Natural Infrastructure:

The idea of natural infrastructure is quickly gaining traction in the literature and in worldwide adaptation planning. The idea is simple but effective. Infrastructure allows overlying structures to function. As road networks facilitate vehicle transportation, natural infrastructure (consisting of healthy ecosystems) enable overlying structures and services to function. A healthy river that capably spawns salmon allows them to sustain their populations and therefore to provide many services to their ecosystem, including recreational fishing for humans. The idea is closely related to ecosystem services, and is in keeping with taking honest and holistic account of all of natures' bounty so that we do not squander it.

6. Engage Youth

Much of adaptation research leads to the conclusion that a certain amount of cognitive rewiring will be necessary to produce a more adaptable society, with the greatest potential transformation being with youth. Tom Johnson, in a presentation to the CCAF, called for a “cognitive rewiring” that could help sustain communities, and in his experience, youth are the most open to having their thinking changed⁹. The CCAF produced a resounding call: engage our youth to make our communities more sustainable and better able to adapt to climate change.⁷ To sustain a community it needs to adapt to secure a future for its youth, a future where they can see a role for themselves. Senator Dan Christmas, in his address to the Forum, challenged the participants to create a future where youth could envision themselves raising their families in the Bras d'Or lake watershed, within the UBR, in their home communities (TODO: add link to Dan Christmas video).⁷ This grounding and strength of place is one of the most durable bases on which to build a sustainable future.

UBRs are financially constrained. Youth are often financially constrained and short on time as well, and so are hard to engage as volunteers. UBRs could act as a conduit to working within UNESCO or within international conservation initiatives. Many young people might be eager to get experience within a larger UNESCO project, and if they see that volunteering within their local UBR could facilitate that, then they may be more willing to donate their valuable time. Ideally this could also be shown to benefit their local UBR as well, as most youth are passionate about dedicating their time to making a difference, particularly in an environmental context. If they strongly identify with a UBR protecting and promoting their sense of place, where they make their sustainable livelihood, and where they see their future, then they will be more willing to volunteer. Many opportunities also exist for young professionals to get involved. Through their employers or by other means, the social credit derived

⁹Tom's presentation can be seen here: <https://youtu.be/DfGcm9Ila7k?t=4788>

from contributing to a laudable cause such as a UBR could be an opportunity to engage. This could be through internship programs, paid co-op summer student programs, or through mentorship programs associated with universities or community groups¹⁰.

Implementation:

1. Organize and facilitate your local school to become a part of the UNESCO Associated Schools Network (https://aspnet.unesco.org/en-us/Pages/About_the_network.aspx).
2. Reach out to local and regional universities to set up co-op opportunities for students.

7. Consolidate and Report

This is the hardest guideline by far, because there is never room in the already tight budget, and in volunteer organizations it is all the more difficult. But its importance cannot be overstated.

Single point reporting and knowledge sharing are required for effective adaptation planning. Brian Ilnicki, the Executive Director of the Land Stewardship Centre of the Beaver Hills Biosphere Reserve, gave a presentation at the CCAF in which he outlined the key guiding principle of their approach, which is to facilitate knowledge sharing by having a central repository of information (their website) on which all members can draw.³¹ Ian Burton, one of Canada's foremost experts in adaptation to climate change, stressed that in order for an organization to capably adapt to climate change, they have to (1) maintain and strengthen a knowledge base, and (2) synthesize and share knowledge to avoid duplication of work¹⁴. It also allows you to build a knowledge base, rather than a scattering of impenetrable "shelf reports". Adaptation planning is a long-term exercise, and the ability to sustain momentum, in part, depends on the ease of access to accumulated knowledge.

The ultimate goal is to adapt to climate change so that the UBR has the ecological resilience to continue to function. To adapt to climate change you need a sense of vulnerability (a vulnerability assessment), and a sense of adaptive capacity. From these assessments, projects are proposed. Over time, multiple projects start and finish. If they are to be part of a whole, to be part of a cohesive idea for the UBR to adapt, then there needs to be a document that plans their core components. This is an adaptation plan. It outlines what kinds of projects the UBR should support or initiate in order to adapt to expected changes within the UBR, or within its connected network. This plan needs to emphasize both the opportunities presented, as well as the main risks and uncertainties.⁶ Lastly, and this is important,

¹⁰Tracy George of the CEPI Youth gave a presentation to the CCAF on the programs and initiatives for engaging youth within the Bras d'Or Lakes Biosphere Reserve. Watch it at this link: <https://youtu.be/U6trAG7W4tE?t=2785>

there needs to be a formal process adopted that is meant to capture the learning from each project, so that it can be used as feedback for future projects. The adaptation plan should address both the vulnerability and adaptive capacity of the organization as well as the system or network within which it operates, even if they are outside the direct control of the organization.⁶

Implementation:

1. Create a single point repository. A single place where all relevant information is collected and organized. Also, this is where the UBRs adaptation plan, and impact and vulnerability assessments go. This should be in a place that is easily accessible, whether it is a website (See for example the Beaver Hills Initiative website <http://www.beaverhills.ca/resources/>) or a private online shared storage website such as Dropbox (<http://www.dropbox.com>).
2. Plan recurring updates to each document created in the process. It is very important that you update your impacts assessment as information changes.⁶ This is quite difficult to implement in a volunteer based organization, but is not significantly different from the periodic review process, and could be handled in a similar manner. Perhaps there is opportunity to synchronize these things, putting in a motion to have an updated adaptation plan one year prior to periodic review in order to have an updated plan to incorporate into the application.

Conclusion

Though not formally addressed in the majority of UBRs in Canada, climate change adaptation planning represents a massive opportunity for those UBRs to be more engaged with the UNESCO MAB mandate, and to sustain themselves in the Periodic Review process (every decade for every UBR). It seems likely that the review process will either directly or indirectly require UBRs to address adaptation planning in the future. In many cases adaptation planning is ongoing within many UBRs, but it might be done under a different name. We feel, and through the CCAF have articulated, that some systematic organization and action within already familiar operating paradigms of Canadian UBRs would greatly increase their effectiveness with adaptation actions, and would create a more sustainable model.

We want to stress that adaptation planning is not a monumental undertaking. It is an organic process and the first small steps may be the most important. A careful and slow adoption of well thought out actions is likely to be more successful than a grand gesture. These guidelines are designed to grow or shrink, and to apply to a community, a region, or an UBR to move towards adaptation planning. We sincerely hope that every UBR can begin the process, using these guidelines, of writing an adaptation

plan and beginning some small adaptation projects. The essential ingredients comprising an adaptation plan are simply will to make a difference, and the organization to facilitate it. When those with the will to make a difference are scattered, as they sometimes are now, UBRs can be the catalyst to bring them together, empower them, and create outcomes greater than were otherwise possible by the sum of its parts.

More than a missed opportunity, adaptation planning in UBRs is a clear method of furthering their mandate. In planning for climate change, UBRs “enhance local resilience and adaptation to climate change, thus contributing directly to article 7 of the Paris Agreement, which strives to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change by ensuring an adequate adaptation response.”³²

So where do we go from here? The CCAF attendees outlined a number of needs:

1. **Knowledge**
2. **Action**
3. **Guidelines**
4. **Stories**
5. **Money**
6. **Time! Take your time. Be patient.**

These are ambitious needs, but they point to an underlying ethos expressed throughout the workshop. A critical take-home from the CCAF is that the will to act is there, but resources are strained, and knowledge is scattered and hard to integrate. Working towards our shared goal of harnessing collective energy, wisdom, and resources to adapt to climate change, we leave you with ideas for a few concrete steps that can be started tomorrow.

Concrete Steps

The CCAF produced some concrete actions that can be taken immediately. They were:

1. Initiate a fundraising event to begin building resources for community-based adaptation.
2. Begin a project in your biosphere to monitor some key indicators of ecosystem health. These form the backbone of the overall UBR adaptation plan.
3. Outline and share the governance model at work in your UBR with other UBRs in Canada. With such a diverse set of arrangements, there is certainly room for collaborative learning on how to

overcome governance challenges.

4. Search out climate service organizations that might have already created regional and local projections of expected climate change. Or visit Environment Canada’s climate information portal to determine expected local and regional changes (Here is an example of the federal information portal for Baddeck: <https://climatedata.ca/explore/location/?loc=CABFY>).
5. Use social media to reach out and engage people around the issue. Create a hashtag or start a blog for your UBR. Begin sharing videos of local adaptation actions on YouTube. The CCAF suggested we begin a “Adaptation Minute” format that could briefly explain ongoing work within Canada’s UBRs. This communication tool could be spearheaded by a CBRA committee that would engage potential funders and partners.
6. Hold a workshop in your UBR in order to get all voices to the table to have their say on what they see as part of the UBR’s future.
7. Distribute the one-pager associated with these guidelines to your board members.
8. Determine a storage space to put all currently existing relevant information on climate change adaptation within your UBR. There are many options for this. It could be as simple as a shared Dropbox (<https://www.dropbox.com>), or a full-blown website.

These guidelines are a “call to arms” for those involved in UBRs to begin to take advantage of the great opportunities available to capably adapt to climate change and support the sustainable development goals. We hope you are inspired to take action, and to use these guidelines to frame the project and plans ongoing in your UBR.

As the CCAF came to a close, Mi’kmaw Elder Albert Marshall spoke words of warning, of fear, and of hope. Grave concern for the health of Mother Earth and of future generations was at the forefront of his words¹¹. Later in the day Marilyn Capreol, an Anishinaabe from Shawanaga First Nation, spoke of the promise to the Creator in a prayer ceremony to ensure that life continues¹². He finished with these thoughts:

“We are not questioning the integrity of the actions of the past; all we are doing is, we are drawing lessons from the past in which we can prepare our future generations so that they will have a healthy and long life like we have. [T]his is where we stand. We are doing everything we can to exercise our inherent responsibility, not just to be the idea and voice of Mother Earth, but to do something in which I can honestly say that if I live long enough

¹¹Please watch all of Albert Marshall’s message here: <https://youtu.be/l2l4KEQjDRs?t=21>

¹²The prayer can be seen here: <https://youtu.be/79k7yk1M0zk?t=4980>

for my grandchildren when they ask me, “What did you do?” I may not brag too much but I think I can say, “At least I’ve done something.”

So this is the message I want to impart to you. So, thank you very much."

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