Final Report - Sustainable Solutions Biomimicry Workshop

2015 Webinar Series and In-Person Session in Livingston, MT August 2015
Marie Z. Bourgeois, Certified Biomimicry Professional
US EPA Region 8 - Environmental Stewardship Unit

Background: US EPA Region 8 Environmental Stewardship Unit, in partnership with the EPA Montana Tribal Program, offered a Sustainable Solutions Biomimicry Workshop beginning in March, 2015. This workshop was designed for Tribal and other government professionals, individuals, and students seeking an intensive, interdisciplinary, and experiential introduction to nature-based solutions and the biomimicry methodology. Because biomimicry principles and practices straddle disciplines, we strongly encouraged individuals from a diversity of disciplines to learn, appreciate, and interact together. Government agencies have a large number of scientists and engineers but lack expertise in business and design. Bringing in expertise from outside of government adds value to the experience. People from the fields of architecture, landscape architecture, the sciences, engineering, business, and planning were invited to attend. The workshop was limited to four Teams of 4-6 people each. Each team identified one environmental challenge to address during the course of the workshop. This workshop was held via five on-line webinar sessions, one optional four-day in person session in Montana in August 2015, and one follow-up webinar to present the Team solutions to the design challenges. At least one person from each team was required to attend the in-person session.

Team challenges:
Climate Change: How does nature adapt to changing water availability?
Communicate: How does nature communicate between species and to the young?
Team Lifeblood: How does nature foster a connection and maintain symbiotic relationships?
Team Disturbandets: How does nature manage extreme amount of water both physically and chemically?

On-line Webinar Education: The webinars were scheduled for once per month from March – July and designed to use the materials prepared and piloted by the Environmental Stewardship Unit in two previous biomimicry workshops. The webinars were hosted via a grant between Montana State University Peaks to Prairies P2RX Center and the ESU. Participation during the "live" presentation was

recommended to facilitate interaction; however, the webinars were recorded and posted on the internet for viewing later. Team members participating in the live webinars and were able to ask questions, although active participation was low. Each webinar was designed to present one step in the biomimicry methodology, drawing upon Traditional Ecological Knowledge, and how we can learn from Nature. We had 24 applications and participants were assigned one of the Team challenge groups. They were asked to meet virtually at least 2 times per month to complete the homework. The classes are progressive and it was necessary for Teams to complete homework assignments each month, as each assignment built upon the previous one. The sessions were recorded and all materials necessary for the monthly homework were posted on the Peaks to Prarie P2RX Center web site.

The in-person session provided an opportunity for further Team work and for instruction by Biomimicry Professionals who helped each Team dive deeper into the Biomimicry methodology and provided one-on-one assistance to each Team. The session ended with presentation on the approach and outcome for three of the four team challenges.

In-Person session: In order to facilitate team interaction and as an opportunity for team members to work with biomimicry experts one-on-one, an in-person session was scheduled for August 9-14 at a remote location near Livingston, MT. This site was originally selected to make it easy for Montana tribal members to attend, although the registered tribal members dropped out of the workshop prior to this event.

A work session with the biomimicry consultants was held on 8/8 to determine what stage each team was in, what assistance was needed to develop a project outcome. It was determine that the following assistance would best serve this purpose:

- Individual consults with three Biomimicry Professionals at the session. Ms. Bourgeois took notes and served to guide the conversation during these consults so that participants could focus on asking question and receiving feedback.
- A session on abstracting design principles was needed and assigned to the consultants, as many participant either did not understand how to do this task, or requested additional education on the process.
- The consultants were asked to present “My Life as a Biomimic” informal discussion after dinner to provide information on how biomimicry is being applied across the planet.

The challenge teams were required to send at least one team members to the in-person session and to bring this knowledge back to their team. These teams provided a short summery of their work to date prior to the 8/8 meeting with contractors. Three of the challenge teams had 2 team members attend. One person who attended the Biomimicry Workshop 2012 was invited to participate and share his expertise. No one from the Climate Change Team participated due to personal conflicts. Team members met with Biomimicry Professionals Karen Allen, Jamie Dwyer and Marie Bourgeois for consults on 8/10. The goal of this assistance was to understand where each team was in the biomimicry methodology, offer assistance in identifying natural models and design assistance in formulating a final product. Summaries of the technical consults with each of these three teams are provided as Attachment 1.

The in-person agenda was developed to facilitate further learning in biomimicry and focused on further development of the final product. Because there was no participation by tribal members, the exercise

in using traditional knowledge from native tribal culture was developed and presented by the ESU and resulted in participants incorporating the culture approach of knowledge-belief-practice into their final products. The worksheet is included as Attachment 2.

Sessions noted on the exercises developed and conducted by the Montana Tribal Program by Certified Biomimicry Professional, Diana Hammer are included in Attachment 3.

Time was scheduled for team work. Ms. Bourgeois teaches a group of students in biomimicry using an on-line platform and arrangements were made to present the students final products to these biomimicry experts as a way to get additional feedback from biomimicry professionals. Because the internet connection was poor at the facility location, Ms. Bourgeois traveled into Livingston, MT the morning of 8/13 to engage this group. The feedback obtained was recorded and provided to the participants during the close out webinar.

Final Products: Each of the three challenge teams produced an outline of their final products. Further work needs to be done to implement these solutions.
They are presented as power point slides and can be viewed in the final webinar link:
http://peakstoprairies.org/webinars/

Attachment 1

Team Disturbandents: How does nature manage extreme amount of water both physically and chemically?

Technical consult with Biomimicry Professionals: Jamie Dwyer, Karen Allen and Marie Bourgeois
Date: 08/10/2015

Outcome: Need to identify end user and end product is and do you have enough biological models, if not – what else is needed.

Background: The Team narrowed down the challenge to flooding. In the realm of disturbance – check out biological models to guide towards a solution. Manage flooding as a function. Focus on organisms all over the planet. Discovering phase is done 1st. Narrow what we could design based on what we had. Either nature avoids flooding, living above the flood zone, or use water as resource. Set up ecology of landscape to prepare for disturbance, then the landscape if ready for any extreme flooding issues. Use permaculture principles to do this. Path forward – organize the system for flooding, then design a technical engineered system that would deal with extremes.

Organize the biology in the system to do the biology of excess water control, then develop tech solutions for extreme flood events.

What is your context? The Rocky Mountain Front is huge system. When are you most vulnerable? This perspective will give your project focus –it is why you look at specific biology?

Recommendations for your final product – first organize your system to be responsive to floods, then apply the tech solutions.

Solid - lay out the necessity to organize the system to be responsive to floods.

The organization part is huge, acknowledge that this is current science that people have already discovered and identified.

Assume that it is taken care of – this will become your new context. EX: New A,B,C is done, then this solutions.

Adjust the landscape to slow and spread water. These become your context. In Boulder example – how and where to apply your solutions. High up in watershed, use permaculture principles, once these have been exhausted, then apply new solutions to deal with excess. Principles from other places that deal with water that can be transferred to this ecosystem.

This solution will be important to the user group – need to identify.

Permaculture principle – what are these and how would you apply these to place.

The team looked a lot of research, then tried to focus on tech solutions.

Restoration ecologists have this knowledge. Dissipate energy, spread it out, sink it in. What are the key elements that are doing these functions, EX: grasses, trees etc. – worth looking at – what are the organisms that slow flow and how are they doing it.

Use biology directly to do these functions - biology does what it does, now use biology one step away to develop tech solutions.

How does nature create roughness in the system?

For example: What can the team emulate to create new systems?

If the landscape is designed right – when the biology does what it can, how can we deal with the excess? Get the policy in place first for caring for the ecosystem.

Need recommendations for resources for the restoration of the system.

Look at ecosystem at top of watershed. How have humans affected the system? You then have a baseline for what the system could absorb, then you know how much water you need to design for.

Make it clear that this solution assumes an intact ecosystem. Look for historical data to tell how much water you need to deal with. Make this a clear assumption. State which permaculture principles you will use, and what they will take care of – this will add credibility to your solutions.

Outcomes: What will be your solution and who is your audience? It would be good to have a prototype to demonstrate what we mean. Could be presentation to engineers who are dealing with flooding. Meet with Chief Resiliency Officer for the City. Use CU money to develop a plan for the part of the creek that flows through CU.

Need to dive into the biology.

What function did you look at: for manage water, what search terms did you use? Team reviewed their biological approach……

General overview, then notice the themes
Repurpose, avoid, manage, intercept flows Need to add dissipate energy. Team wants to harness this energy, for whatever. Karen got a lot of sub-functions from your research. Need to look at nature's strategies in the example the team found.

Purify the water is not a chief function in your solution. The other functions deal with one function and purify water is a different function. Team wants a multi-functional design to purify and manage water. Mechanics of osmosis so that barriers will also use osmosis to uptake water and store pure water. Awesome to do all of these things, but the solution will not handle all of these at once.

Mechanics of cell structure – use as a model. Look at mechanism of osmosis, but design something that will only allow uptake of water, not contaminants, this would be a solution. A solution

Aquaporin – in living cells, kidney. It's a selective mechanism that has a solute gradient and structure that allows this to occur.

If the biology was doing its work to slow flow, the tech system may work.

Need to determine your context – maybe the City of Boulder already put resources into protecting their water treatment plant, so does not want this extra function.

Team would like a system that can "stand alone" and be placed anywhere to perform in a flood. Have feedback loop in mechanism that would respond when a flood event. Has feedback to the environment. A negative feedback loop – the more water, the more the system is implemented.

Have barriers filled with water and make available to other communities who need this resource. Goes back to context – facilitate process downstream. Think about the range of gradient – Best used in a local area – like a city block, these are high value stakeholders. Use on-site as needed, especially in areas where the water is knocked out due to flood.

For final product – ID types of flooding that could use this design.

These are the mechanism that may be useful, or places that have no other options, then in places that don't need it – will have an option for their high energy process.

Design for the Have nothing context – then can use anywhere.

Look at scale – cell level may not scale up to large system. Some design principles from nature may be able to scale up, some cannot. Design barriers to be at nature's scale, then scale up cactus mechanism to store clean water, use multi- scale for final design.

Modularity – built in components – cellular and nested.

Moss may be a good natural model – performs both functions.

Incorporate spider webs – move liquids one direction. How do you get the water where you want it – what is the circulatory system you will use to direct flow – the spider web may be useful for this challenge?

Hydrophobic and hydrophilic – how can these work together? Tie with gradients.

Can you look at something that increases surface area – then move it in several difference directions. Where is the water coming from – seeping up, or a wave of water coming, need surface to take up what kind of flow. These issues would be addressed in the "biological pre work" of the system.

Abstract the principles of the cactus – can expand and contract, that is the function. We want the entire system to react to any water from anywhere. Design a superstructure to encapsulate a lot of mini-systems. Do not want to specify the direction of flow.

What is the spider web structure you will emulate?

- What are those parameters and systems that make these work?
- How does surface area work to our advantage?
- In spider web – there are nodes, so you have multi direction water interception. Depth and width of the web is important – dimension for water interception. Moves water away to shed water.
- These are the questions to ask, what is the importance of depth, etc., what makes it work best?

Membrane is biggest challenge – how to design that membrane? All our organism play a role in this, how to bring them together for a solutions. Need more examples of organisms that can draw water.

Succulents – get withered away, but swell up in a flood.

Some species require water and nutrients to come. Or use water to move seeds. City would still "work" despite the flood – use the water as a dependable point in the system. Use water as necessary part of ecosystem. Work with the flood – go with the flow. Goes with water purification part, capture nutrient to use. Design a whole city solution to use flood energy and water for a purpose.

How can we look at the amazon and use these strategies? This is a cyclic process and predicable. Need examples of using organism that adapt to unpredictable events.

Use the AND principle – damaging and resilient.

Need to narrow your context for this challenge.

Right now team is at a divergent process – need to narrow down the context in order to design project in the time you have now.

Boulder is context – where we are now. Add other ideas for future of the idea.

Look at floating island international, Out of MT. Multi-function design for cleaning water. Look on internet for information.

Next steps – learn more about how membranes work. Cells and osmosis. Learn the cellular component. Shape is important. Need to get into specifications work in the barrier – what is the specific design parameters that we need?

Priority is the membranes – larger function. Then we can understand the need for the superstructure to hold the micro structure filter.

Deliverable: Proof of concepts in written form that will deliver funding source for prototype. Encourage publication of negative outcomes to advance the idea.

Who would you thank? – is this biomimicry, or is this just another cool idea? Comfort zone is important – so people will think of ideas only in that area of expertise.

Team Lifeblood: How does nature foster a connection and maintain symbiotic relationships?

Technical consult with Biomimicry Professionals: Jamie Dwyer, Karen Allen and Marie Bourgeois
Date; 08/10/2015

Background: Current state – our focus is the function of working with tribe on plot of land disturbed from over grazing. How does nature maintain symbiotic relationship between grazing and riverbeds?

What is happening in the system – what are the symptoms? Bare banks, lots of erosion, plant that are significant to tribe are becoming rare, a track going into the river is overused, vegetation is gone or bare.

The Team should articulate this context – Karen sees a different functions in this. Damage from tribal owned cattle. Riverbank may be open to others – did not get a defined scope from the tribe. 4-wheelers goes thru, people do not respect the rules. Education system of tribe is poor, tribal members do not understand the consequences of their land use patterns.

What can we do to keep people and cattle off the river bank – BMP already exist, so issue is not to ID what to do, but how to communicate these to tribes. Do not know is these BMPs are a sustainable approach. Look at the land – the best management is to determine what can it hold and limit cattle to this level.

Outcome from session: We lost direction. The Team did research as outlined in summary. There is not a lot of research and what is available has not gone thru scientific method and is in dispute. None is very definitive. How do you get people together to implement a solution?

The Team did a good job in choosing 3 models. What are the functions lost by grazing? Trample banks, streams widening, incises, groundwater drops…

What are the system elements in an intact river basin, here in this area? And what was lost and what are the functions we can reintroduce to mitigate these functions?
Example – slow flow by putting in "fake" beaver dams to restore that function. What is the function we want to emulate from the beavers – they slow flow.
What system elements that we want to emulate – to restore the function.

System is past a threshold, gone over the edge. What are example to help bring it back from this threshold? How can we have a net positive effect? So that when we introduce this vegetation, it can have a chance to take hold.

How are the BMP being used to restore function and what functions are not being met by BMPs – this is where biomimicry can add value.

Need to meet tribe where they are – more receptive of where they are in BMPs. Tribes are tapped out, have limited resources and priority is low to engage.

For example: Create off channel watering. Stream is fenced off or provide different source of water. What are the functions retired or what are the functions preserved, and what are some of the system element s performing that function?

What functions are gained by implementing this BMP? Is this enough? Time frame is important. Just changing top down stuff does not change the hydrology. Depends upon the system – some systems, just taking the cattle off, the willows may come back, but if the willows are gone due to overgrazing, you will need to plant new willows.

Example – some systems you need to raise the ground water level or re-meander the river and restore the floodplain. Done by hydrologist. Reconnect the river with the floodplain. An engineered "beaver dam" help with this, then once it is more restored, can bring back the hydrology, then the vegetation.

Do you want to reconnect tribal members to the river?

Either way – need to look at whole river system, not just river.

One idea is to use a tiered structures- tiered system, three level of degradation that look at what functions need to be restored. These are the function lost in a totally degraded system, here are the BMPs used to address this problem area… go on with other 2 tiers of stream viability. How do we teach or share this information on a lower level of knowledge and understanding by tribal members. Almost a matrix, functions lost, what restores these. Start with intact system, and identify the functions lost.

Focus solution on stream function and don't worry about if the tribe will apply the solution. This will allow the team to learn the methodology. Can use the solutions for any community.

Create a physical model to play with. Huge impact to SEE what it means. Who know about floodplains? All of these little things are adding to the functionality, when you take them away, this is what happens.

Function cards – "capture energy" – find all examples and develop a story and tell the story. Trap sediment, shading, dissipate energy, provide habitat for migrating animals. As they tell the story you can augment with biology – good way to learn.

Can do in reverse – what are parts of the system that are not good for the system? What are those components that demonstrate the system is out of balance.

Develop matrix or spread sheet of functions lost or present in healthy system. Figure out which plant communities, species contribute to this function. Tie to functions in a game format.

Don't worry about what has already been done – what can we discover? Biomimicry function lens is a good approach – things that people usually don't look at. It becomes tangible in this lens. Put their mindset in a different light.

What are the functions lost in each level of degraded river system and strategies to restore? What do you mean by "partially degraded" and get your mind around the definition.

Another lens is using LPs. What LP do the willow embody?

Example from Karen – invasive species coming into a restoration project- what to do? Look at invasive species functionally, will these fallout of the system once that function has been restored and nature will take over.

A second engagement activity – look at what is in BMP and what functions these fulfill and prioritize the BMPS – which ones are worth implementing. One BMP is the most important – do this first. If you do this one thing it accomplishes 5 functions……

If tribal members have first engaged in the function game – they would be more interested in implementing BMPs on a priority timeline.

Outcome: 1) Educational opportunity and activity to engage tribal member to the river and 2) prioritization of existing BMPs using the function lens.

Go for walk, come back with 3 organisms you discover – and observe their functions. Could we come up with 3 biomimicry case study about restoration of streams that we could use as an example to present to the tribe?

Attachment 1

Technical consult with Biomimicry Professionals: Jamie Dwyer, Karen Allen and Marie Bourgeois
08/10/2015

Team Communicate: How does nature communicate between species and to the young?

Background: Environmental challenge: How does nature communicate? Functions were identified by creating a mind map and include motivation, coordination, accountability, sharing, and decision-making. The Team identified two different areas of application:

- Communicate among diverse groups or groups over distances with different needs via on-line classes.
- Communication to youth that fosters learning.

The challenge is the great need to connect people in society, to foster better and deeper connections between people, connect humans to Gaia, and to use nature to educate children about nature.

The approach to communicate to young is to look at modeling nature's behaviors, how to teach young and why, thru play and role model. In order to foster better communication between student and teacher for on-line classes the challenge is to create a learning platform and virtual learning site that mimics nature's connection strategies. How can we build tools around this issue?

For children the goals is to incorporate this learning into their mindset. Also kids teaching the leaders, bringing back home the message. Priorities and decision-making are constraints in virtual learning landscapes. The goal is to create community in virtual learning.

Question for the experts: Virtual learning landscape is what some team members want to focus on. Children's learning part must also be included. The virtual platform is not best way to engage kids. Is it best for us to come back together as a team to solve this issue? The Team decided to focus on the two groups separately, as different strategies are needed for each group.

1) Communicate among diverse groups or groups over distances with different needs via on-line classes.
Nature communicates using all of the senses. Communication is receiving message and receiving signals. Look at how nature communicates is via different signals, which are received by various ways. In human context – we are able to send out a lot of signals, but how it is received is difficult. Signals must be received. Is the signal being received?

Nature does not have the same constraints that humans have such as fast signals or too many signals. This is why the team has a hard time to use nature's strategies.

Can we learn from nature on how to be simple with the message? Examples found in nature include:

- Cells filter much information and are able to filter out inapplicable info.

- Looked at signal reception: Socastic resonance is used in hairs and picks up specific signals. Noise is added to allow peaks to cross threshold. Valuable information is uplifted by the noise.

Create more robust filters, then only the interesting stuff can come thru. Noise must be a specific type of noise.

- For bees and quorums communication is simple. When trying to find new hive – the scouts will come back and advertise the new site. As soon as 15 bees are dancing for the same hive site – they hive moves. This strategy cuts out excess information. Individual bees make individual decisions and come to a collective outcome without a top down direction. Not a leader directed decision, but each individual following simple rules. A self-organized pattered emerges. Regan energy is an example.

Outcome: Decide what your deliverable will to make the process more clear.

Collaborate tools is one of interest. How does nature collaborate? Part of this is communication. Exchanging benefits and maintaining relationship becomes the function. Communication is part of this.

How to collaborate between on-line groups of all age groups – is one idea. How to create a community. Interest in connecting children to nature – ingrain the info to become stewards of nature.

1) Teach children
Kids like to do sensory awareness activities. Teach about sense in nature. This is different between humans and there organisms. Example – dog uses nose a lot to sense nature or night vision in some organisms. Pollination – why are all these plants yellow and purple?

As a biomimic – you could do that by doing research and developing a nice lesson plan – what is the biomimicry aspect of this? How does nature sense and communicate – the functional aspect. What would you teach them rather than what do you teach them. Play, imitate, ways nature learns.

Karen has lecture on senses for communication. One idea – develop iSites for children. Start from reconnect – teach stewardship and how to observe, teach thru reconnect both of these aspects. In natural world – so much, will not have trouble finding examples of this.

Birds can sense magnetism, urine – they still "see" this, we cannot. Heat detection is another. Mosquitos detect Co2.

Outcome: Come up with a tool kit of reconnect exercise or game that engages children in emulate nature. iSties for children. Link with appreciation of nature. Nature needs different senses – get that message across. Is it 4 hours – or full day, a year, what is time frame? Create exercises for time allowed that creates tangible outcomes of reconnect to nature.

How to show what you did makes a difference. Time, what exercise is, materials, props, slides, blindfolds, hand lens, facilitate notes for yourself and learning objectives. Put in matrix. Key debrief points. Pullout objectives and how to reiterate.
How to evaluate? Ask what did you learn and who will you tell about it? Act out skit about what they learned – use all their senses. Draw a picture. Develop game where each kid gets a card about one organism – do a skit and guess the sense…Example of emulate – how can this idea be applied in their house.

2) How does nature engage?

Virtual communication: challenge is learning in virtual groups – participation. How to you facilitate participation. Incentive and needs of specie in nature. Must be some need that must be addressed that requires participation. Then exchange can occur. In virtual platform – need not identified, not immediately visible. We can talk about how important it is, but reasons of multi-tasking, does not rise to level of participation. Collaboration is important. Face to face has consequences – something will happen is you don't engage. When we e see the other person, it's a bigger investment. Communication is more than words (5% of communication) – in virtual more sense are engaged. What are other incentives will help if face-to-face is not possible. Flowers look good – animal want to connect into it. How can we design an aesthetic appeal to it where people will more likely interact? The element of addressing needs – starts with asking what needs are. What is your need? People more matched with their needs so more apt to engage. Compare to symbiotic relationships.

Is there one aspect of simple rules – is it time to have a meeting and is a meeting the best way to deliver this information. What kind of attention or input do I need? Make transparent the need. Flower knows bird need nectar – wants pollinator.

Outcome: Map out type of scenario needed for engagement and find examples in nature where this scenario delivers engagement. Find the simple rules. Design principles at the pattern level. Find the higher level patterns.

How do you prime the space – to get this engagement? Acknowledge these are movable frameworks – can change with tasks and situation.

Look at personality type sot determine how to engage different people.

Coevolution relationships would be good examples.

Put down deposit for "free" class – some $ given back for participation. Determines what the value is to the other person. Have an incentive to put time into it.

What needs are and what resources do you have to meet these needs.

Needs to determine the needs of your group.

Will be different factors: time, space, visual or auditory signal is different than face-to-face. These are the context you have in common with nature.

Howe to do this in act nature: How does nature self-organize, process information, compete, it will be an overlap of several different functions.

Dialogue over debate – now it's "my job is to stand my ground". Is there a common ground to share ideas, not right or wrong, engagement rather than battle. How is completion avoided? Adapt to optimize –how to evolve.

Traditional Ecological Knowledge
Looking at Native American Wisdom

Attachment 2: by Marie Bourgeois, Certified Biomimicry Professional

Introduction: Traditional knowledge is a knowledge-practice-belief complex. Traditional Ecological Knowledge is a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.

Using the TEK approach to engage stakeholders: This exercise is designed to determine if and how your function was communicated within Native culture and apply this approach to your challenge. Using available resources to research native cultures to identify examples of how the function of your challenge was communicated verbally, through song, story or drawings within native cultures and use this approach to engage the community in acting sustainably when working with your function. Remember, the success of TEK is due to its integration into the culture of a society. Culture determines how the community will live and act in relationship to the natural environment.

For example, there are many examples of how to communicate a message.

For this example, how could you use every day object to communicate a message about sustainability? Could this everyday object perform other functions so that the recipient of the message is in regular contact with the object and its' message?

Crafts: Basket making is used to preserve the native culture, materials and spiritual beliefs, Cherokee double-woven baskets are the oldest form of basketry in the Southeast. Before the Cherokee removal in the mid-nineteenth century, basket weaving was an integral part of the women's role in the tribe. Baskets were used to hold corn, squash, beans, and other food crops. Each clan had distinct basket patterns which were woven in honor of "Ka no he lv hi," the old ways. The names of their designs—Mountain Peaks, Peace Pipe, Flowing Water—evoke the essence of Cherokee culture and served to pass down traditional skills and knowledge to each generation.
Functions: Transfer knowledge, decoration, carry food, pass down skills and honor nature

Your Task: Using the examples found in the available resources, choose one or more methods to incorporate the action message of your challenge into song, dance, story, art, etc. Remember, the value of this approach is that it uses a knowledge-practice-belief complex to integrate the message into the cultural beliefs of the community.

Attachment 3: Summary of Diana Hammer, Montana Tribal Program Workshop Notes

8/9/15

Speaker: Tom Oliff, National Park Service – Four Decades of Conservation in YNP

8/10/15

Rotation - While the other teams met with Jamie and Karen and Marie took notes, I met with each group in succession - Looking for Strategies in Nature

Team Communicate Jayne Michaud and Kendra Krueger with Greg Varhola

Looking for the various and different ways Nature communicates
Smell, color, sound, shape, behavior, chemicals, etc. – plants, animal species;
How does Nature communicate in ways that are beyond our senses? UV, infrared, beyond our audible range, etc. Look using a function lens.

Team Disturbandits Ted Thayer and Matt Pfeiffer with Greg Varhola

Looking for various ways Nature manages floods, excess water, etc. Looking upstream to intact vegetation, wetlands, etc. that help absorb and control run-off, reduce erosion and then what could be put in place downstream, lower in the watershed to help reduce flood damage and flows; examples – wetlands, riparian vegetation, mosses; barrel cactus; how are roads constructed – temporal needs; can it be submersed at times? What are the operating conditions? Context of our challenge

Team LifeBlood Peter Criscione and Wendy Weaver

Looking for healthy and unhealthy riparian systems in Nature – what is missing in the unhealthy, disturbed systems? What essential functions does a healthy riparian system have and how might those be replicated, restored? Three core functions: shade/canopy; bank stabilization; diversity of niches/spp.

Agenda changes

My Life as a Biomimic with Karen and Jamie

Tuesday, 8/11/15

Team Reports

Team Communicate

Jayne- (re)connect ethos focus
Views ethos and (re) connect as a precursor to emulate
Outcome: create a teachers' packet designed for experiential learning with children

Kendra- Engaging others in an online learning environment

Looking at different types of relationships (mutualistic, parasitic, etc.) and under what conditions these relationships exist; rules, patterns.
Outcome: simple rules of engagement

Team LifeBlood

More focused on community engagement strategy around river/water.
Outcome: 1) community engagement with a series of exercises – maybe a functional scavenger hunt or tie species with function; 2) BMPs for the Jocko River – look for multi-functionality

Disturbandits

Flood control with water purification – need to nail down context
Outcome: proof-of-concept

Wednesday, 8/12/15

TEK exercise 9-10:45 am Introduction and Team work
10:45-11:30 am Discussion/Report out

Team Communicate

Jayne – weaving a story figuratively and literally with senses; create a "tapestry" story-telling embed with very rich with symbolism

Kendra – look at communication among groups; rituals e.g, opening ceremonies, rites of passage

Team Disturbandits

Ted/Matt – Myths around flooding; use as a cautionary tale; change behavior.
Ted's limerick ☺

Team LifeBlood

Peter – CSKT – River Honoring. Opportunity to incorporate additional learning re: maintaining and restoring healthy watersheds, riparian areas. Cultural connections – maybe create a flag or other visual display – as daily reminders of desired behaviors. What traditional practices are still taught, practiced regularly? (Suggested he look for opportunities to work with KCC and SCC; I gave him a copy of the Braids and Learn about the River DVDs).

Turtle Mtn. example

LP Presentation 11:30-12:30 pm

Team Presentations 2 pm

Team Disturbandits – Ted and Matt: GODams

Addressing floods of biblical proportions in Boulder, CO

Scoping: assume permaculture principles applied first – upstream
Discovering: 1) avoidance; 2) prepare for stress; 3) water as a resource
Creating: Water as a resource
Inspiration from moss – high surface area, adhesion + cohesion repeating structures
Inspiration from barrel cactus – layers of rigid/flexible; expandable
Design specs: 1) semi-permanent; 2) water as structure; 3) water as a resource = filtration; and 4) life-friendly chemistry
Tested proto-type – Sham-wow
Next steps: materials research; filtration science; LCA
Karen: not possible to store and filter at a large scale;
Matt: oh yes you can! ☺

Team Communicate

Mind Map; Context; Split into two groups: youth and among individuals

Kendra (among individuals): Online Learning Landscape

How does Nature Communicate? Engage participants?
Challenges, drop-outs; view as an ecosystem
Bromeliads: create community as an ecosystem
Sea anemone/clown fish: symbiotic relationships; maintain relationships
Self-regulation and control: feedback system
Mood forecast

Jayne (children/youth): (re)connect children and Nature

3-5th graders (9-11 year olds)
iSies → (re)connect
TK = story-telling
Birds: Repetitive sounds → convey information/reinforce messages
Squirrels: Play/role modeling → change beliefs, view points
Bees' waggle dance: Physical movement → build memory
Create a detailed facilitators' guide with activities (iSite, blindfold, organisms using senses, Thank Nature!)

Team LifeBlood

Peter (and Wendy): Healthy Riparian Areas on the Flathead Reservation

Challenges: ATVs, irrigation, cattle, loss of native and medicinal plants
Outcome I: Matrix showing functions lost, BMPs, prioritization scheme
Outcome II: Community Outreach, primarily with women; River Honoring and possible "rewards" and daily reminders
Inspirations: root ball – mesh of interwoven fibers/roots; architecture – multiple diameter structures; diversity of structures/layers - canopy/habitat

Feedback

- First meeting
- Cross-pollination
- Charge a fee
- Receive RH upon completion of the workshop or have people purchase

(= investment)

- 5 vs 6 webinars
- Timing – offer in winter; summer too busy
- CEUs
- Shorter timeframe

Visioning

Closing Circle