Terminal Evaluation of the APFNet Project: "Adaptation of Asia Pacific Forests to Climate Change" [2011P5/6-UBC]

Conducted by John Niles, University of California San Diego

July 23, 2015

Terminal Evaluation Report Contents

(L. to R. University of British Columbia Research Associate Dr. Brad Seely; Project Evaluator John Niles; and Dr. Qinglin Li, Carbon Modeling Analyst of the BC Ministry of Forestry; at the Malcolm Knapp Research Forest, one of the two pilot sites of the project. April 25, 2015)

Acronyms and Abbreviations

APFNet	Asia Pacific Network for Sustainable Forest Management and Rehabilitation
AP	Asia Pacific
IPCC	Intergovernmental Panel on Climate Change
AR5	5th Assessment Report of the Intergovernmental Panel on Climate Change
MKRF	Malcolm Knapp Research Forest
UBC	University of British Columbia
EA	Executing Agency
TE	Terminal Evaluation

Acknowledgements

I would like to thank the project personnel and the APFNet Secretariat staff for providing me the opportunity to learn about this project and to conduct the Terminal Evaluation. In particular, I am very grateful to Zhang Yang of APFNet, and Dr. John Innes and Guangyu Wang of the University of British Columbia. The exceptional hospitality of the entire UBC team was very much appreciated.

Executive summary

The project "Adaptation of Asia Pacific Forests to Climate Change" [2011P5/6-UBC] has been a clear success. The project was well organized and led by a capable management team. The international collaborations developed under this project are likely to continue to grow in size and importance as the issue of climate change becomes more central to the Asia Pacific (AP) forests. A suite of strong outcomes from the project will help AP economies adapt their forests to climate change. Most notable of these is the development of **ClimateAP**, a new model that allows users easy access to understand, at a very high resolution, the past and future climate regimes their forests have and will face. Combined with rigorous modeling of species, bioclimatic factors and management challenges and tradeoffs, the project is a showcase for how international research can provide real world benefits to climate change adaptation and forest professionals. The project has completed all of its intended outputs to very high professional standards.

Outputs	Mid-Term	Final	Notes
1. Inception Meeting, literature review, gap analyses	**C**[1]	**C**	Original scoping papers complete, but do not have a publish date, nor appear to have been published beyond project website
2. Development of high-resolution "ClimateAP" model	**P**[2]	**C**	Exceptional work completed with potential for major contributions to AP forest adaptation and beyond, ground-breaking in many regards
3. Niche-based & process-based ecological models	**P**	**C**	Academically strong collaborative work completed for multiple models and species, with scientific understandings from the models made available to the public.
4. Pilot studies and recommendations	**P**	**C**	Pilot sites improved models' quality and specific recommendations proposed
5. Communication and network building and technology transfer	**P**	**C**	Excellent workshops held and reports produced, a high number of people exposed to project. As often the case, more can be done to transfer technology & build capacity
6. Web-based spatial visualization and climate tools for APFNet	**P**	**C**	Excellent user-friendly web-based ClimateAP model completed, significant web-based platform for spatial visualization of niche-based model projections

[1] "C" stands for the status of the Outputs as "Completed"
[2] "P" stands for the status of the Outputs as "Pending"

1. Introduction

The purpose of this Terminal Evaluation (TE) is to provide the Asia Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) and the Project Team with an independent third-party perspective on overall implementation and execution of this 36- month project. The project was a $1,039,200 grant to the Executing Agency (EA), the Department of Forest Resources Management, Faculty of Forestry, University of British Columbia (UBC).

The goal of the project was to:

> *"…Help forest managers and policy makers to develop effective management strategies to maintain resilient forest ecosystems for adaptation to climate change."*

The mission of the APFNet is to:

> *"…Help promote and improve sustainable forest management and rehabilitation through capacity building, information exchange, and support for regional policy dialogues and pilot projects."*

The project had six main objectives[3]:

1. Examination of the current status of studies of climate change in the region to identify knowledge gaps;
2. Development of high-resolution climate models and vegetation remote sensing database for the entire Asia-Pacific region;
3. Development of ecological models for several major forest tree species to predict shifts in their suitable climatic niches in the future;
4. Pilot site experiments to develop adaptive strategies for climate change through the integration of model predictions with local forest management practices;
5. Establishing a network of scientists, stakeholders and policy makers to facilitate information sharing and knowledge transfer;

[3] These six objective were copied word-for-word from the project website (viewed on May 1, 2015), http://asiapacific.forestry.ubc.ca/objectives/ .

6. Development of web tools to facilitate easy access to climate and ecological models, and other information.

Related to the six main objectives, the project had six projected outputs, which are listed below. These outputs also had detailed activities, associated budgets, and work plans which guided management of the grant implementation.

1. Inception meeting, literature review(s), gap analyses;
2. Development of high-resolution climate model "ClimateAP";
3. Niche-based and process-based ecological models;
4. Pilot studies and recommendations;
5. Communication and network building and technology transfer;
6. Web-based spatial visualization and climate tools for APFNet.

Terminal evaluation *is performed upon completion of a project implementation, assessing whether the goal(s) and objectives are met effectively and whether extension is needed and how the achievements can be sustained.*

The purpose of this report and the TE was to "provide a comprehensive assessment of the achievement of the project from November 1st, 2011 to October 31st, 2014"[4]. Furthermore, the Terminal Evaluation aims to diagnose the status of the project goals and objectives and to determine and evaluate their implementation level. Finally and most important, the purpose of the TE is to provide APFNet, the Executing Agency and other interested Parties with suggestions and recommendations for enhancing the overall success and impact of the project and, if any extension is warranted. This includes providing suggestions for improving project performance and impact in a next phase.

[4] APFNet Consultancy Services Contract, April 2015.

2. Evaluation Design and implementation

The TE Design and Evaluation process was determined by the administrative procedures of the APFNet, guidance documents on evaluations, and discussions between the reviewer, APFNet, and the Executing Agency at UBC. The TE was officially commenced on April 21and ended May 27, 2015.

The TE included a site visit by John Niles to UBC and the Malcolm Knapp Research Forest (MKRF) from April 23-27, 2015. This site visit included four meetings and discussions about the project, including one nine-hour discussion on the first day. Two meetings were continued over dinners and a fourth discussion was held after the visit to the field station. These discussions were the most critical part of the TE, as the face-to-face discussions yielded important insight about the project for the reviewer. The sheer density of the project work (the amount of objectives and the highly-technical nature of much of the modeling) meant that in the reading of materials, the actual positive impacts **that the project has achieved were apparent, but not entirely appreciated.** This is discussed later in the findings section of the report.

2a. Scope and Methods of the Evaluation

The scope of the evaluation was to provide an overall assessment of the project and to provide recommendations for any future related work. The TE's scope was based on guidance provided by the APFNet, as well as a discussion with both project management and APFNet.

The TE did not substantially focus on the financial components of the project, since there was a complete final audit and three annual audits that were prepared under the guidance and rules of the University of British Columbia.

Also, since this was a final evaluation, and a Phase 2 is being discussed, there was an emphasis on providing recommendations for a possible extension of the work. Unlike the Mid-Term Evaluation (which covered any outstanding work in more detail) this evaluation focused on whether the work proposed was completed, to

what standard, and based on the evaluator's review, what recommendations could be made to improve the overall efficacy of future related work.

The scope of TE was guided by a draft proposed TE plan developed by the reviewer and revised in consultations with the APFNet staff. The methods for the TE included the following components:

1. Careful reading of APFNet monitoring and evaluation materials, including the "APFNet Guidelines on Project Monitoring and Evaluation"
2. Review of a suite of project-related documents provided to the reviewer, that included:
    a. Three Annual Progress Report and one Mid-Term Progress Report
    b. Three annual work plans
    c. A 50-page Mid-Term evaluation conducted by Shuoxin Zhang (College of Forestry, Northwest A&F University, Yangling, China) and Shyue-cherng Liaw (Department of Geography, National Taiwan Normal University, Chinese Taipei)
    d. A 5-page response to by the project to the Mid-Term Evaluation
    e. Two summary papers from May 2013, including:
        i. Climate Change and Forestry in the Asia Pacific
        ii. Climate Change and Forest Policy in the Asia Pacific
    f. Final Project Reports, including:
        i. Project Completion Report
        ii. Final Audit Report
        iii. Final Technical Report
        iv. Climate Policy Brief
        v. International Climate Policy Brief
        vi. 17 separate appendixes
        vii. 871 pages (4 separate documents) of project-related publications
3. Clarifying questions on the materials provided were given to the project staff and APFNet and discussed initially on a Skype conversation (April 221, between Guangyu Wang, Zhang Yang, and John Niles).

4. Further exchange with APFNet regarding prioritization of materials and ensuring comprehensive preparedness
5. Initial introductions to key project participants facilitated by APFNet
6. Finalization of logistical planning and exchange of initial ideas, via email, final TE site visit plan and logistics confirmed
7. Site visit, which included:
    a. A nine-hour session
    b. Two working dinners,
    c. A half day site visit to one of the pilot sites, and
    d. A three-hour follow up discussion
8. Follow up questions with key personnel, provided via email on April 25, 2015
9. Report drafting April 25 – May 6, 2015
10. Sharing of preliminary findings and draft report on May 6, 2015
11. Discussions and feedback and modifications from May 6 to May 14, 2015
12. Several rounds of additional requests for clarifications and subsequent revisions from mid-May through mid July
13. Report completion, following roughly Annex B Evaluation Report Format, as suggested in Guidelines for APFNet Project Monitoring and Evaluation, July 17, 2015

2b. Stakeholders involved

The stakeholders involved in the TE included:

Reviewer:

John O. Niles, Lecturer and Visiting Scholar, University of California, San Diego and Faculty, Greenhouse Gas Management Institute

APFNet:

Zhang Yang, (M.S), Division of Project Management, APFNet Secretariat

Executing Agency (UBC):

Dr. John Innes, Dean and Professor, Faculty of Forestry, UBC. Project leader

Dr. Guangyu Wang, Assistant Dean, Faculty of Forestry, UBC. Project coordinator

Dr. Tongli Wang, Associate Director, Department of Forest and Conservation Science, UBC

Dr. Qinglin Li, Carbon Modeling Analyst, BC Ministry of Forestry, Canada

Dr. Brad Seely, Research Associate, Department of Forest Resources Management, UBC

Dr. Haijun Kang, PhD Candidate, Fujian Agriculture and Forestry University, China

Mr. Yuhao Lu, PhD Student, Integrated Remote Sensing Lab, Department of Forest Resources Management, UBC

3. Analysis and findings

Overall, this review found the "Adaptation of Asia Pacific Forests to Climate Change" project has been a clear success. The project management was very successful in its overall goal and specific objectives and outputs. It is highly likely, should the project continue in a second phase, that the continued work would provide compelling benefits to sustainable forest management in a world with changing climate regimes.

Management Recommendations:

Most notably, the project produced a set of **management recommendations** to help AP economies adapt their forestry practices to climate change, including[5]:

- Plant mixed aged and mixed species stands
- Use a mix of species-specific rotations
- Maximize co-benefits
- Fertilize only when soils are low in N and/or P
- Use prescribed burns or thinning to reduce fire risk
- Monitor changes with common indicators (e.g. bud break and other seasonal phenological indicators)
- Keep management plans flexible, adaptable, and diverse

[5] APFNet Research Project Final Report. PowerPoint (unpublished). John Innes, UBC, April 24, 2015. These recommendations were also contained in various project related materials.

These management recommendations are very valuable and if implemented, could result in significant economic, ecological and human gains in a changing world. They are clearly based on the strong underlying science and modeling and also informed by strong forest management principles. These concepts deserve significant attention, and are an important contribution to the future of sustainable forests in the AP region.

ClimateAP:

In addition to the policy suggestions informed by the project listed above, the development of **ClimateAP** is clearly the anchor of this project. The novelty and usefulness of the high-resolution, user-friendly ClimateAP should be further taken advantage of and promoted.

Illuminated by the project, the challenges that face forests in the AP region in terms of climate change are well documented in terms of a range of mostly negative impacts (although some species in some places, such as Douglas Fir and Masson Pine, may benefit from a changing climate). However, when it comes to turning science into policy, the strength of the ClimateAP model is most profound. Policy makers at every level of governance now have at their disposal, a highly tuned model that allows both backward and forward understanding of climatic conditions. They also have detailed understanding of key species, and how these species are likely to be impacted by climate change.

In a world where climate change is going to grow more intense and the impacts of climate change are going to be more pronounced, the importance of ClimateAP should not be underestimated. It is clear from speaking with the project team, that ClimateAP is already garnering significant attention. This is very likely to grow over time.

Climte AP is based on best available climate data sources which were then significantly improved by ClimateAP. The ClimateAP fills the vacancy of existing academic work, given that previous climate data was provided by the World Clime

model, but at a given 1 km resolution (very rough). In the old model, the resolution was fixed, and could not be made higher. One of Climate AP's great advances over previous work was to make the resolution of modeling and understanding higher that prior work.

Furthermore, World Climate was globally available but was not the best data source. The better information was available through Prism, which was only available for China and was not open to users worldwide. Climate AP used the data from Prism that was available (which covered most of AP region such as Mongolia, China, Taiwan). Thus, ClimateAP combined many new and powerful data and model efforts to greatly improve the ability to forward and backward project climate change on forests in the AP region.

Additionally, Prism does not have historical data for China. Climate AP incorporates historical and future data into the package, thus achieving highly satisfactory improvements on the available information, models and tools for decision makers for forests in the AP region.

In terms of helping policy makers, before ClimateAP, one needed sophisticated GIS skills to manipulate data and models to produce geographically explicit information regarding climate change and forests. Another novelty and highly-significant advance of ClimateAP is that one does not need advanced GIS skills nor need any specific systems requirements. ClimateAP is extremely user friendly and thus expands the range and number of users that can have additional high-resolution information regarding climate change.

Other Climate Niche Models:

Other models were also further developed and refined by the project, including: Physiological Principles to Predict Growth (3-PG); TACA-GEM, TACA-GAP, LANDIS, FORECAST Climate, DLM-Ecohydro. Among other useful outcomes, these climate niche models for five major forest tree species in the region found consensus projections of climate niche distributions. For example, the FORECAST model (used

with the ForWaDy forest hydrology model) was successfully used to simulate the impacts of climate change on forest growth and development, and in particular forest water stress. By linking the two models (into FORECAST Climate), the project supported a powerful new tool for exploring and understanding climate change impacts on forest growth by improved understanding of ecosystem structure and function.

Specifically, the linked FORECAST Climate model allowed users to examine how species might respond to probable climate change impacts, such as:

- Productivity
- Water stress
- Mortality rates
- litter decomposition
- nutrient cycling

The application of FORECAST Climate represents a significant advancement over previous efforts to project the impacts of climate change on long-term forest growth and development in the coastal BC and Fujian Province regions. Specifically, the capability of the model to incorporate projected changes in precipitation patterns, growing season length and changes in water-use efficiency associated with increasing concentrations of atmospheric CO_2 are unprecedented.

Moreover, the hybrid calibration approach employed by the model requires for relatively minor levels of calibration data compared to other process-based models used to predict the impact of climate change on forest growth and development.

The built-in solar radiation model facilitates a straightforward approach to explore the potential impacts of slope and aspect on radiation loads and the long-term development of water stress.

Lastly, the detailed output generated by the model allows the user to track the impacts of climate change and alternative forest management strategies on a wide variety of indicators of sustainable forest resource management.

Another example of the substantial improvements from prior related work is evident in the TACA/Landis II model outputs. This new work, which improved prior efforts and filled academic gaps, helps decision makers understand probable tradeoffs to maximize ecosystem services, socio-economic factors. This is now possible for a wider range of species and locations, based on some of the pilot site work and model development.

Remote Sensing Tools:

In addition to the models above, the project went further then its original mandate and explored LiDAR and other remote sensing tools. The project's work on these tools are providing further insights into how the AP forests can be understood and managed in the context of climate change. They are also showcasing how cutting edge technologies such as LiDAR may increasingly be used to help AP forests adapt.

For example, work done by the project using remote sensing and normalized difference vegetation index (NDVI) produced greater understanding between vegetation productivity and climate change for various ecosystems through the Asia Pacific region. This improved understanding which improves on previous estimates, suggests regions of particular concern to climate change and will allow policy makers to adjust policies and forest management strategies.

By exploring LiDAR, the project also improved on prior academic work to link LiDAR with the 3-PG model. This work yields high accuracy information for project managements and professionals at a scale and level of precision that was not available before. This work also helps managers understand the difference between LiDAR and field work to know the most appropriate tool for specific applications.

Other Models:

On the other models, the suite of tools that this project helped further develop is impressive. The improvements in these models aided by the project are providing important and detailed understanding of the critical issues that forests and species will face in coming years. Notably, the climate niche models are providing very specific information for particular species of considerable economic value and overall interest. While the project invested considerable time and effort into adapting and improving a range of models (not just climate niche models, but also process-based models such as FORECAST), it is clear that these models are not things to be considered "completed" by this project. At least not in the sense the ClimateAP is now - based solely on the resources provided by the project - developed, highly-functional, relatively complete, and easily available for other non-modeler colleagues in the AP region to use.

The climate niche based models filled academic niches better than previous efforts by providing consensus projections for key variable for multiple species. This in turn demonstrates the work to be highly satisfactory and allows improved adaptation methods to be employed.

Key forest/climate change variables:

The greater understanding of **key forests/climate change variables** that have been enabled by the project have improved understanding of how forest will respond to climate change and what are some of the tradeoffs with certain decisions. So this work, while not as concretely completed, is producing important academic findings and improving the overall scientific basis for decision making for forest adaptation to climate change in the AP region. Work on these models also has helped build a larger and stronger community of interconnected academics and economies.

For instance, the 3-PG model was successfully used by the project to analyze future distribution areas for key species in China (such as Chinese Fir, *Cunninghamia lanceolata*) in terms of their range and productivity. This work produce detailed and novel estimates of where a likely northern expansion of Chinese fir is likely to occur,

which will allow planners and tree farmers to begin to adapt their techniques and policies to world experiencing climate change.

Networking and Capacity Building:

Finally the efforts to share and communicate and build a network around forest adaptation are evident from the project work. The number of people that have been educated on adaptation and forestry issues is extremely impressive. Furthermore, the seminars and trainings and workshops have had clear capacity building results. Of these, some of the most relevant for policy makers have been the (yet-unpublished) economy reports. There has been a clear and concerted effort by the project to build a community of science-grounded forest adaptation professionals, and this work will grow in importance over time as climate change begins to more severely impact forests in the AP region.

The networking and capacity building is one obvious area where the project has produce highly-satisfactory outcomes, improving on all previous related efforts. The project supported training and networking, through numerous workshops and other events. The human skills that were developed by the project allowed various country reports to be generated that provide clear examples of some of the challenges forests in the Asia Pacific region will face under climate change, and at the same time provides for specific management recommendations that can be used to counter climate change.

This is most evident in the following table, drawn from the summary project presentations, and reproduced below. It should be noted that all the below indicators are the direct result of the project and are a clear demonstration of the success of the project. They are clear indicators of how the project has improved capacity in the region and helping grow the ability of the AP region to adapt its forestry practices to climate change.

Item	Number of Events	Total number of people involved	Duration
Visiting Delegates	12	280	Less than a week
Training and Workshops	4	350	One week
Academic training, graduate students, and visiting scholars	6	6	3 months and up
Conferences	7	380	Half day seminars
Seminars	16	860	Half day seminars

4. Evaluation Results and Conclusions

The following two tables describe the major evaluation results and conclusions.

Project Objective/Outputs /Activities (in line with PD)	**Indicators** (in line with PD)	**Progress made (% completion of activities and degree of output/objective achievement)**	**Evaluator's rating[6]**	**Evaluator's comments**
Output 1:	Literature reviews and Gap analysis	Two comprehensive reports were published in 2013, 100%	Highly Satisfactory	These reports should list a date of publication (especially due to time-sensitivity of material).
Output 2:	ClimateAP w/ 5 GCMs from IPCC AR4, >100%	Exceptional work done to extremely high standards, >100%	Highly Satisfactory	Exceptional work, highly satisfactory given: 1) the aggregation and improvement of previous models, 2) user-friendly nature and high resolution of Climate AP (significant advances over previous work). More could be done to increase the profile of this critical model

[6] The rating criteria are the same with Annex 3 Project Overall rating table that ranks from highly satisfactory, satisfactory, moderate, unsatisfactory, highly unsatisfactory and D/I

Output 3:	Niche-based models for three species and projections with five AR4 models	>100%, excellent work to inform forest professionals on likely changes for key species, and recommendations	Highly satisfactory	This work is highly satisfactory given the improved model coordination and level of specificity (previously not realized) that will give forest management additional information for planning for climate change.
Output 4:	Process-based models, indicators and recommendations	100%	Highly satisfactory	The project is highly satisfactory in its work given how it significantly improves forest management decision making, based on specific local conditions and species (such as increased pest monitoring, suggestion to do mixed planting).
Output 5:	Workshops, conferences,	100%	Highly satisfactory	There have been very strong capacity building and

	extensions notes, network building, capacity			extensive network building, which overtime must grow and evolve. The project greatly improved the skills and network of forest managers and equipped them with many additional tools and suggestions, not available before.
Output 6:	Web based tools	100%	Satisfactory	ClimateAP is widely available and easy to use, other models also described on line and adequate references provided; Excellent for ClimateAP, less so for other models

Project Overall Rating Table

Criterion	Description of Strong Performance	Description of Poor Performance	Evaluator's Rating	Evaluator's Brief Justification
Relevance of Project Design	The project is highly relevant to the AP region, given the low knowledge of, and high probability of, substantially changing forest conditions	NA	HS	The relevance of the project to the adaptation challenges is very high. The project has furthermore made its work relevant by providing excellent tools and outreach to key constituencies.
Efficiency	The project was able to complete a remarkable amount of work given the resources.	NA	HS	Given the timeframe and budget, the project has achieved very important outcomes and has operated highly efficiently.
Effectiveness	The project was highly effective in its implementation on all accounts.	NA	HS	The project has been overall very effective. It has been able to achieve its high overall effectiveness by collaborating widely and engaging a range of stakeholders who can operationalize the findings into practice.
Impacts	The project is having clear impacts on knowledge of forest adaptation issues, and building capacity and tools	The project can do a better job communicating with policy makers	S	The project is having clear impacts on the ability of AP economies to adapt their forests to climate change, through the provision of ClimateAP, other models and capacity building in the region. More outreach and communication to other

				potential collaborators and policy makers will improve the long term impact of the project.
Sustainability and duplicability	Capacity building and model development and use will continue and can expand	Enhanced capacity building and communication will improve sustainability.	HS	The project is likely to be sustained and initial work duplicated and expanded on by having provided a strong core model, subsidiary models, capacity building and web-based tools. Most important, a network of scientifically-informed foresters have been trained in some of the latest findings and technologies necessary for robust forest climate change adaptation.
Overall Score			**HS**	The project is exemplary in terms of science-based, policy relevant, international cooperation.

5. Recommendations and Lessons Learnt

The project has clearly been an overwhelming success. It has also completed what one could call the **"inception stage"**. Significant amount of modeling and data acquisition and software development were completed. Models were further calibrated with pilot site date and a range of models were demonstrated to be effective at informing forestry in the coming decades.

In addition, **a community of interested professionals** has been exposed to basic principles of evidence-based adaptation, there have been some very good training programs, important graduate student exchanges, and **clear sensitization of policy makers** to the topic of climate change adaption and sustainable forestry.

In terms of recommendations, the following concepts are offered for consideration:

1. Build on the significant success of the ClimateAP by:

- Increasing the profile of the model, for instance by approaching a reporter or using the media more actively to promote the significance and the novelty of the model.
- Ask the people who use the model to voluntarily sign up for updates, and provide basic information. This will help the project and APFNet better understand the use of the model and the distribution of the users. This, over time, may also provide further insights into where appropriate trainings can be targeted, or for instance making some of the introductory material available in other languages.
- Actively reach out to the IPCC community to encourage the scientific community to use ClimateAP in future assessment reports.
- Develop a web-based platform where practitioners of ClimateAP can share ideas and co-develop products.
- Present some of the model projections at non-scientific meetings, such as UNFCCC meetings or other policy situations where policy makers can be educated about the model, as well as sustainable forest management practices or adaptation.

2. Provide more web-based links to more of the models that have been worked on by the project. Currently, only the ClimateAP model is fully described on the project website. This may be due to several valid reasons (the models are actually housed elsewhere, there are some concerns associate with people using models that are not properly trained). However, the project and the APFNet may improve overall forestry practices in the AP region by at least, providing some additional basic information about other models (climate niche based models, process based models, 3P-G, Forecast, TACA, LANDIS II, CBM, and integrated models). While there is some information on the project website, this information can be expanded and links provided to other sites that house and distribute such models.

3. In terms of climate change, fires and insect expansions are two of the most damaging causes of forest loss and degradation under climate change. However, these are stochastic phenomenon, and the use of models alone may not convince policy makers to consider alternative sustainable forest practices. **It may be useful to think, during Phase 2, how these important but non-linear changes may impacts economies** and how this can be effectively communicated to policy makers. The project has been able to provide specific recommendations for adapting AP forests to climate change, however, it is also important for the project team to actively promote its work through social media and other avenues to increase the uptake of the information and models by the policy making community.

4. One key finding from the project work is that it may not be best practices to simply cease all human interventions (thinning, prescribed burns, etc) in protected areas. In some AP economies, protected areas still does not allow active management. This is a major finding from the project's work, and should be more widely broadcast to the region.

Of note, the recommendation to use prescribed burns and thinning appears to be especially important for some AP economies and locations where such practices are prohibited (e.g., some protected forest in China). Phase 2 of this project, should it

proceed, **may wish to focus on how this message can best be communicated in such a way as to lead to actual policy changes**. Some suggestions include considering a paper that combines some of the fire frequency change possibilities alongside economic models. This would help policy makers understand the repercussions to foregoing the above recommendations, and the possible consequences for economics in a particular region.

5. Strengthen capacity building. Looking ahead to future possible work, the project may wish to consider deepening the types of training and professional and student exchanges that are supported. The project did a very good job engaging a wide range of policy makers and professionals. For Phase 1, this work was done to very high standards and accomplished a broad appreciation for the importance of better understanding and adapting forest management to climate change. One comment from the mid-term evaluation stands out. That report noted ***"Due to the limitation of time, trainees didn't have enough opportunities to test and practice those models developed by the project"*.** This observation is an important one.

6. It is critical that in any subsequent work, that there be **increasing investments in training programs that go beyond a workshop format**. Workshops are critical to sensitize others to project-related work and to build a common understanding and community of interested colleagues. However, due to the complex issues surrounding forests and climate change adaptation in the AP region, and the range of models that can be used to better inform decision making (as well as the complexity of some of the models), more sustainable and advanced training should be focused on **achieving proficiency in the use of adaptation models to inform policy by the larger AP region**.

7. Improve communication and systems between the APFNet and projects to get information to the public in a timely manner. The initial papers that synthesized AP forest and climate change were very valuable compendiums. However, it appears there was some confusion surrounding where and how these reports would be made public. This process should be strengthened in subsequent phases.

8. Improve overall communication of the results of the project, noting that social media is evolving. People seeking information about subjects (for instance climate change adaptation and forestry) obtain their information through new medium. The project (or the APFNet) may wish to consider a dedicated person whose responsibilities are focused on mass communication. A good model for how science-based policy information is highly publicized is the Center for international Forestry Research (www.cifor.org). This group does an excellent job promoting its research and making the results clearly available to interested decision makers. CIFOR invests heavily in communications and this pays dividends in making research more available, raising the profile of certain projects and the network, and probably helps fund raise from international donors.

One specific example of how the project results could be better communicated would be in the reports of economies that were carried out. These reports provide valuable insight into key model findings related to climate change adaptation and sustainable forestry. However, they have not been widely disseminated. Some valid reasons for why these have not been published include not releasing results until efforts at peer-review have been undertaken. However, there should be a goal to have the reports about forest and adaptation issues made available to economies so that the findings can be absorbed into policy. Furthermore, these reports should be available in locally appropriate languages. This would help disseminate key specific findings to AP economies, and a small investment into translation and a communications expert could vastly increase the use of the reports to improve adaptation for forestry in select AP economies.

Annex 1. Evaluation Agenda

April 23: Mr. Niles arrives in Vancouver on 11:00pm. Stay in the Downtown Vancouver

April 24 Friday

9:00 Welcome and introduction (Niles and Dean Innes)

9:30 John Innes: Project completion presentation and Q/A,

Specific presentations:

11:00 am Tongli Wang: CimateAP, ecosystem niche modeling, and web tools, and the models demonstration

12:00 Lunch

1:30 Brad Seely: MKRF modeling, Fujian trade-off modeling, , and the models demonstration

2:15 Qinglin: Carbon modeling and MKRF management trade off modeling, and the models demonstration

3:00 Yuhao: Chinese fir modeling with 3PG, , and the models demonstration

3:30 Guangyu Wang: network building and climate change adaptation in AP region

4:00 Discuss and clarification

5:30 Dinner

April 25 Niles review of presentations and notes, report writing.

April 26: Sunday:

8:30 Site Visit MKRF Research Forests (Qinglin Li, Brad Seely)

15:00 Meeting with team members in the afternoon and feedback from Mr. Niles

17:30 Dinner

April 27: 9:30 Leave Vancouver