SUMMARY REPORT

Manitoba Agriculture Food and Rural Initiatives
and Manitoba Conservation
Prairies Regional Adaptation Collaborative

Manitoba's Agricultural Climate Change Adaptive Planning Workshop

Winnipeg, Manitoba
November 30th to December 1, 2011
Winnipeg Winter Club

A project in partnership with:

Manitoba Alberta SRC

University of Regina PARC Saskatchewan Watershed Authority

With funding support provided by:

Natural Resources Canada / Ressources naturelles Canada

Canada

Technical Assistance provided by: Deloitte. iisd International Institute for Sustainable Development / Institut international du développement durable

EXECUTIVE SUMMARY

On November 30th and December 1st, 2011 Manitoba Agriculture, Food and Rural Initiatives (MAFRI) hosted a two-day Agricultural Climate Change Adaptation Workshop. The workshop was facilitated by Deloitte as part of the Terrestrial (forests and grasslands) component of the Prairies Regional Adaptation Collaborative (PRAC) initiative. This workshop was held in Winnipeg, Manitoba, and was attended by 35 participants, mainly consisting of Government of Manitoba employees from four provincial government departments. The workshop was focused on climate change adaptation for the cattle and forage sectors in Manitoba.

This workshop was designed to: 1) create awareness regarding climate change and the potential impacts on agriculture, and more specifically the forage and grassland sectors; 2) to demonstrate and apply a risk-based climate change adaptation planning framework; and 3) to allow participants to assess the use of the framework for application within MAFRI.

The workshop began with greetings from Fred Meier (Deputy Ministers of Conservation) and Barry Todd (Deputy Minister of MAFRI). Following these opening remarks two presentations given by Dr. Danny Blair (University of Winnipeg) and Dr. Jeff Thorpe (Saskatchewan Research Council) on '*Current and Projected Temperature and Precipitation Trends in* Manitoba' and '*Future Impacts to Forage and Grasslands Sectors'*, respectively. The intention of initiating the workshop with these presentations was to level-set the participants with foundational climate change science to prepare for the planned risk assessment activities.

The participants were oriented to the Adaptation Framework by a presentation from Geneva Claesson (a Sustainability & Climate Change specialist with Deloitte. The presentation focused on outlining the key concepts of the framework and the steps involved to assess an organization's adaptive capacity to respond to climate change by analyzing vulnerability and risk. A final presentation was given during the lunch hour by Dr. Paul Bullock featuring '*Future Impacts to Manitoba's Crop Sector*'.

Following the morning session, participants were divided into breakout groups for the remainder of the two-day workshop. During this time they were given the opportunity to go through the vulnerability and risk assessment process in order to determine MAFRIs organizational vulnerability to climate change using the forage and beef sectors as a test theme. All of Agro-Manitoba was assessed for a 10-year planning process, and climate impacts were based on 2050 climate predictions. Participants were provided with a summary of climate projections for Manitoba in addition to a short list of programs currently being administered by the provincial and federal governments that are somewhat involved in adaptation to climate change. An initial planning step in the framework is the compilation of current adaptation-related programs and policies; MAFRI completed this step prior to the workshop.

After completing the vulnerability and risk assessment process, to focus participants for the adaptation identification step, Dr. Thorpe gave a second presentation on potential adaptation options for Manitoba grasslands developed with reference previous research on grassland vulnerability completed for the PRAC. The session concluded with a final breakout session

where participants were asked to identify adaptation options that MAFRI could implement to assist producers in adapting the forage and beef sectors to climate change.

Outputs obtained from the workshop included: a list of current policies and programs being implemented by provincial and federal governments, a preliminary vulnerability and risk assessment for the forage and beef sectors in Manitoba, a list of suggestions provided by participants on how to modify the SRD framework for use by MAFRI, and suggestions on next steps for MAFRI and other provincial governments in adapting to climate change.

Overall, participants felt that adaptation to climate change is important for MAFRI and other provincial departments to be involved in however it should be done as a collaborative effort and an inter-departmental adaptation team should be developed to carry out this process.

The following report gives a detailed summary of the two-day adaptive planning workshop.

BACKGROUND

Manitoba is a key partner in the Prairies Regional Adaptation Collaborative (PRAC), which is a joint partnership with Alberta, Saskatchewan and Natural Resources Canada. The PRAC has three main themes: water resource management, drought and excess moisture management, and terrestrial ecosystems adaptation. The PRAC was initiated to build capacity among decision-makers in order to incorporate adaptation in to current policies and programs, to encourage knowledge transfer, and to develop adaptation options that mitigate risks and enhance opportunities resulting from climate change in the three Prairie Provinces.

In November 2010, MAFRI and Manitoba Conservation held a successful Inter-departmental Workshop on Climate Change Adaptation in Winnipeg as part of the Terrestrial component of the PRAC. This purpose of this workshop was to demonstrate the use of an adaptation framework to four provincial departments (MAFRI, Conservation, Water Stewardship, and Local Government), and to identify potential adaptation options using a framework developed by the Government of Alberta's Sustainable Resource Development Department for the grassland and forest ecosystems in Manitoba's Parkland Region. This workshop provided a preliminary assessment, and in September 2011 MAFRI began planning for a second workshop to build upon the November 2010 workshop. This second workshop was held in Winnipeg, Manitoba where 35 participants (Appendix A) convened from the same four provincial governments; however, for this workshop the focus was on the forage and beef sectors in Manitoba. The workshop objectives were as follows:

1. Evaluate, at a high-level, organizational vulnerability and risks for MAFRI to climate change impacts on grasslands, and to identify potential adaptation options for priority risks;
2. Communicate and demonstrate the use of an adaptation planning framework to incorporate adaptation into decision-making;
3. Obtain feedback from workshop participants on potential modifications to the Alberta Sustainable Resource Development (SRD) Climate Change Adaptation Framework, and identify possible gaps, barriers to and opportunities for integrating climate change adaptation into existing decision-making processes; and
4. Generate interest and commitment to adaptation readiness and resilience within MAFRI, Conservation and other departments.

Materials provided to participants prior to, during and following the workshop included:

1. The workshop agenda (Appendix B);
2. The Climate Change Adaptation Framework Manual, which includes the step by step process that Alberta SRD followed[1];
3. Terms of Reference[2] for the assessments were provided at the workshop (Appendix C)
4. A list of provincial and federal policies and programs currently in place that could assist with adaptation (Appendix D)
5. A summary of projected climate impacts for Southern Manitoba (Appendix E)

[1] Note: the workshop was facilitated with slight modifications for MAFRI's forage and beef sectors.
[2] Note: the Adaptation Framework includes a process to develop a 'Terms of Reference' for the assessment. A sample was provided to participants as a case study to test the assessment method.

6. A copy of the presentations given by Dr. Blair, Dr. Thorpe, and Dr. Bullock.

Summary of Workshop Proceedings

MORNING SESSION: November 30th, 2011

Geneva Claesson initiated the workshop by providing the objectives for the two days and the agenda. She then introduced the DMs of Conservation and MAFRI to give welcoming remarks.

Dr. Fred Meier
Deputy Minister of Conservation

The DM of Conservation provided opening remarks which mentioned the Climate Change Report from the National Round Table on the Environment and Economy (NRTEE) that highlights the importance of spending today to adapt to climate change in order to offset the future costs. He indicated that Conservation will lead climate change adaptation for the overall provincial government in the coming years.

Dr. Barry Todd
Deputy Minister of MAFRI

The DM of MAFRI followed the DM of Conservation with opening remarks. He indicated that climate change will have significant impacts on agriculture and that the Manitoba agriculture industry represents $5 billion dollars in sales annually and this industry feeds into the food processing sector, which is responsible for 25% of Manitoba's economic output. He went on to state that 20 million acres in Manitoba is devoted to crops and livestock production and it is the government's responsibility to guide communities in dealing with the impacts of climate change. He highlighted the importance of these interdepartmental workshops that bring specialists together to identify long term solutions because in government we are very good at responding to immediate threats but not so good at seeing and dealing with the long-term.

Presentations on Temperature and Precipitation Trends, and Climate Change Impacts on Grasslands and Crops

Four presentations were given during the morning session to provide workshop participants with the background information required to complete the vulnerability and risk assessment process for the remainder of the workshop. Scientific presentations were given by: Dr. Danny Blair, Dr. Jeff Thorpe, and Dr. Paul Bullock, and an introduction on the adaptation framework that would later be applied was given by Geneva Claesson.

Dr. Danny Blair
Acting Associate Dean of Science, Principle of the Richardson College for the Environment
University of Winnipeg
Presentation: *Current and Projected Temperature and Precipitation Trends in Manitoba*

Dr. Blair began his presentation by highlighting that the climate does vary based on climatic patterns such as El Niño and La Niña however overall it is still warming. He indicated three key trends: atmospheric CO_2 has now reached 390 ppm; there is not quick solution to minimize the warming; and Canada will experience greater warming than the rest of the world. He went on to provide information on current and projected temperature and precipitation trends in Manitoba.

The presentation highlighted the expected increase in overall variability of weather patterns, increased annual temperatures, increased risk of excess moisture, flooding and drought. It concluded with indications of how these changes in climate may impact the agriculture industry.

Dr. Blair's presentation generated many questions from participants regarding how ozone impacts climate change, how Manitoba will look in the future, and how agriculture can take part in mitigation efforts.

Dr. Jeff Thorpe
Principle Research Scientist
Saskatchewan Research Council (SRC)
Presentation: *Grasslands and Climate Change: Vulnerability and Adaptation Options*

Dr. Thorpe presented on the vulnerability of native grasslands to future climate change based on different temperature and precipitation scenarios of the 2080s. He explained that even in the coolest scenarios we see that vegetation from the US is pushing into Canada, and that even in the warm dry scenarios the decrease in grassland productivity is not as great as we would expect. He highlighted the impact of extreme events, indicating that past droughts have caused a shift in species of prairie grasslands and contributed significantly to tree mortality.

Additionally, Dr. Thorpe noted that there is much more research currently focused on drought compared to excessive moisture, and that these periods of excess moisture may lead to increased production; however the quality of forages may be compromised. A problem that was highlighted was invasive species and their improved ability to adapt to climate change. He ended by mentioning the three Rs to adaptation, which include: Resist (short-term), resilience (medium), and respond (long term). Short term examples included: reducing the number of livestock, moving livestock to alternative grazing, & purchasing feed. Medium term examples included: converting crop land to perennial forages, changing herd structure, planning for increased feed reserves, improvement of water distribution systems & detection and control of invasive species. Long-term examples included: have monitoring systems in place so you can identify directional change when it happens.

Ms. Geneva Claesson
Manager, Sustainability and Climate Change
Deloitte & Touche, Inc.

Just prior to lunch, Geneva provided an overview of the Adaptation Framework that we would later be testing for the remainder of the workshop and was originally developed for Alberta's Sustainable Resource Development (SRD) Department. She explained how Alberta initiated climate change adaption efforts and the context for developing the Adaptation Framework, and also provide examples where other Canadian governments are currently working on adaptation. She went on to explain the four step approach of the Adaptation Framework: scope, vulnerability assessment, risk assessment, and identification of adaptation options. She indicated that when it comes to identifying adaptation options we should look at how MAFRI has coped to recent events and how the department delivers existing policies and programs in order to determine these could be modified in the future. The goal is to identify options for the department to be resilient and adaptive in light of the uncertainty posed by climate change, and as a side-benefit, MAFRI can continue to deliver actions that can contribute to resiliency in the agriculture sector as well.

Dr. Paul Bullock
Professor, Department of Soil Science
University of Manitoba
Presentation: *Climate Change and Manitoba's Agriculture: Potential Impacts*

The keynote speaker over the lunch period was Dr. Paul Bullock. Dr. Bullock began by giving background information on climate projections and highlighted how our greatest challenge is adapting to the increased climate variability and extreme weather (droughts, floods). He demonstrated the positive and negative impacts of increased atmospheric CO_2 concluding that the negative impacts will outweigh the positives. He also mentioned that with this increased CO_2 we will be subjected to more weeds and decreased effectiveness of certain herbicides.

AFTERNOON SESSION: November 30th, 2011

Test Lab 1: Scope and Preparation
The afternoon session began with Geneva providing the workshop participants with the scope of the vulnerability and risk assessments. This gave participants the geographic, organizational, and time horizon boundaries. Workshop participants were then divided into 5 breakout groups.

Test Lab 2: Applying Alberta's SRD Adaptation Framework to Assess the Vulnerability of Manitoba's Forage and Beef Sectors
Ms. Geneva Claesson assisted by Joyanne Lizotte

During the afternoon session participants took part in the first test lab where they evaluated the use of the vulnerability assessment applied for Alberta's SRD for MAFRI's purposes. The forage and beef sectors were used as test themes. Participants were asked to identify climate impacts on sectors, along with current and potential stressors. Prior to the assessment they were provided with a list of current programs and policies being administered by the provincial and federal departments and this list was used to determine the adaptive capacity of the department to future impacts. Results are provided in Table 1 & 2 below.

Table 1: MAFRI's Organizational Vulnerability Assessment for the Support of the Beef Cattle Sector

ES	Climate Change Impacts	Existing Stress	Degree of Sensitivity	Potential Climate-related Stress	Degree of Sensitivity	Total Degree of Sensitivity	Existing Adaptation Responses	Degree of Organizational Adaptive Capacity	Organizational Vulnerability
Cattle Production	Access to forage during freezing rain; quality water available; increased survival of parasites; heat stress on pastures or in crops; extreme weather - survivability, increased mortality; access to water for use and/or storage; Manitoba may be a low cost producer; longer grazing season; reduction in feed requirements during milder winters.	Country of origin; lack of local slaughter capacity; post-BSE effects; feed availability; regional diseases (TB); decreasing cowherd; public perception of environmental effects; changing diets; current market; food traceability; regulation; flood related problems;	Sensitivity was rated as **medium to high** based on market influence	Availability of feed; Availability of water; Decreased forage quality; Water quality; Pests; Disease; Heat Stress; More susceptible to environmental stressors than confined livestock;	Sensitivity to potential stress was also rated as **medium to high**	Total degree of sensitivity was rated as **high**.	Extension & AgriRecovery program; BMP incentive programs (EFAP), AgriStability; Research (ARDI); Conservation districts; weather stations; Drought/Excess moisture planning; Community Pasture Program; Ag Crown lands policy; DFA;	Organizational Adaptive Capacity was rated as **medium** due to the fact that programs and policy emphasis has been related to income losses and not adaptation. Business risk management programs dominate the political budgets and account for an estimated 70% of spending. Also, programs are mostly short term with limited proactive programming. Within Manitoba we work in silos more often that in collaboration with one another.	On average the organizational vulnerability was rated as **high**. The reasoning behind this was the lack of co-ordination between departments in the province, the lack of funding for staff for a long term approach; political whim (short-term thinking); everyone is caught in crisis mode (public, producers and politicians); Region specific differences may mean that there isn't once solution for all of Manitoba

Table 2: MAFRI's Organizational Vulnerability Assessment for the Support of the Forage Sector

ES	Climate Change Impacts	Existing Stress	Degree of Sensitivity	Potential Climate-related Stress	Degree of Sensitivity	Total Degree of Sensitivity	Existing Adaptation Responses	Degree of Organizational Adaptive Capacity	Organizational Vulnerability
Forage Production	Decrease in yields; decrease in quality and palatability; variability in yields; impacts on storage capabilities; increased invasive species; increased risk of disease; increase in grassland acreage in Manitoba; increased growing season	Current extreme weather; flood vs. drought; invasive species; market pricing; poor quality and production in certain areas; market pressure from higher crops; changing land use (more urbanization); forage production being moved to more marginal land; policy related to rangeland; decreasing native grassland;	Average sensitivity rating was **medium** based on the ability of forage to bounce back after poor production years, the relatively low frequency of extreme events	Decrease yield; increased variability; decreased quality; disease; more emphasis on food production vs. forage production; increasing crop prices may cause increased use of marginal lands for crop production	Sensitivity to potential stress was also rated as **medium to high**	Total degree of sensitivity was rated as **medium to high**.	Community Pasture; Drought and excess moisture planning; invasive species council; BMP funding; Ag Crown Lands; Diversification centers; Conservation districts forage seeding; benchmarking project; research (ARDI); recognize the value of marginal lands in land use planning regulations; Agristability; weather stations; Habitat connectivity retention (CON, MHHC, NGOs)	Organizational Adaptive Capacity was rated as **medium** for similar reasons as cattle production. However one group suggested that it was a more stable commodity than cattle.	On average the organizational vulnerability was rated as **high**. The reasoning behind this was similar to those listed for cattle production as well as the lack of funding for research.

Feedback on Vulnerability Assessment Process and Suggestions for Improvement:

Each breakout group provided feedback specific to the process of assessing vulnerability. Their comments are summarized below:

- It might be more beneficial to look at gaps in programming to determine what priorities are urgent instead of looking at existing adaptation responses.
- There should be benchmarks for high/medium/low scores indicating what each score means.
- The process is too high level, intangible and technically complicated. The process is not effective and isn't real.
- Listing the adaptive programs under adaptive capacity seems to give a false sense of capacity. Programs are generally short term and heavily influenced by politics
- This analysis would require a policy re-evaluation every year to incorporate new ideas into the cycle.
- More data is needed to provide the basis for the assessment. This may require additional research.
- There was no real evaluation of the success of the existing programs or policies
- The assessment was issue based vs. department focused
- More consultation with scientific experts would be needed along with expert staff.
- How do you make decisions when one ecosystem service has a major impact on another?
- Producer groups and industry should be involved in the assessment
- Additional activities or alternate activities to assess vulnerability could be to survey staff by email and to assess departmental strategies and priorities.

Following the vulnerability assessment, breakout groups presented and discussed their results. Day 1 then concluded with Ms. Claesson providing the agenda for the following day.

MORNING SESSION: December 1st, 2011

Test Lab 3: Risk Assessment

The second day of the workshop Ms. Claesson summarized events from day one, and gave a refresher summary of the risk assessment process. Following the brief introduction participants began performing the risk assessment on the cattle and forage sectors. The risk assessments involved creating "risk statements" which describe an impact on either cattle or forage resulting from climate change impacts which results in a specific risk for MAFRI (i.e. will MAFRI require more funding for BMP or BRM programs, will current programs be ineffective, will more education or research be required, will strategic planning need to change, etc.). The list of risk statements and risk analysis results obtained from the five breakout groups are summarized below in Table 3 & 4.

Feedback on Risk Assessment Process and Suggestions for Improvement:

Each breakout group provided feedback specific to the process of assessing risk. Their comments are summarized below:

- Presentations on existing programs, involvement of program managers, or assessment of various programs' current adaptive capacity (IISD adaptive capacity tool) would be beneficial throughout this assessment
- Bring in farmers/landowners to give truth to the existing risks/climate impacts
- Get opinion from farmers/landowners to determine which programs they think MAFRI will need based on the risks
- Collaboration with other provincial and federal departments are necessary for an effective vulnerability and risk assessment, possibly through an inter-departmental working group
- Aboriginal engagement regarding Crown Lands would be necessary
- The risk analysis would be better supported with different consequence categories
- Throughout the process it was difficult to see how the vulnerability assessment fit into the risk assessment. It doesn't seem like the same people have to do both the vulnerability assessment and then the risk assessment.
- Technical teams for each sector would be a good idea so that the people evaluating the risks are those that are experts within that sector. This would allow major issues to be identified and then we could expand the collaboration to other departments with structured facilitation.
- For "people" category it should reflect injury and damage to staff – stress
- Financial: >$100 million = catastrophic. Major = 50-100 million, Reasonable = 10-50 million, Minor = 5-10 million, Insignificant = 0-5 million.
- High, medium and low doesn't give enough distinction between categories. It is difficult to prioritize risks and make decisions at the policy level using this type of scale.
- Major concern – MAFRI and Conservation should work collaboratively in the development of their departmental strategies to ensure that cross-cutting issues are addressed in an efficient way.
- Should include a column regarding how it impacts other departments
- The model focuses more on a business plan. It should focus more on our clients and our resources

- When helping producers we need to do a market forecast for growing demand of cattle and forage

Table 3: MAFRI's Organizational Risk Assessment for the Beef Sector

ES	Risk Statement	Vulnerability Assessment Results	Risk Analysis						Risk Ranking
			Consequence					Likelihood	
			S	F	O	P	PC		
Cattle Production	The issue with water availability will boost the demand for increased funding for water supply programs	High	2.5	2.5	3	3	2	4	M
	Increased incidence of disease will increase the need for public education programs to cope with anxiety over diseased cattle		4	4	4	4	4	2	M
	Increased incidence of disease leading to decline in producer livelihood will cause MAFRI to extend more support programs		4	4	4	4	4	2	M
	Extreme drought will minimize MAFRI's ability to meet its strategic objectives because all resources will be shifted to ad hoc BRM programming		2	5	5	2	4	5	H
	Cattle production will likely move north along with forage production which will result in staff shifts		3	1	2	2	2	2	L
	Climate change impacts will require more collaboration between provincial departments		4	3	3	2	1	3	M
	Extremes in the short term will result in the need for education and a shift in resources to maintain animal welfare		2	3	2	2	5	4	H
	Extreme weather events resulting in the lack of available feed and potentially animal evacuation will require a shift in resources to maintain animal welfare		4	5	3	3	5	4	H
	Increased disease outbreaks will result in increased demand for vet services provided by MAFRI		1	5	4	5	5	4	H
	Water and land impacts will lead to increased demand for infrastructure (e.g dams, riparian protection)		5	5	3	3	2	5	M
	Increased disease will lead to increasing demand for food safety and tracking supply chain requirements		5	4	4	5	5	5	H
	Extreme events which deplete agri-recovery program will reduce resources to other areas		5	5	3	1	5	5	H

Table 4: MAFRI's Organizational Risk Assessment for the Forage Sector

ES	Risk Statement	Vulnerability Assessment Results	Risk Analysis						Risk Ranking
			Consequence					Likelihood	
			S	F	O	P	PC		
Forage Production	Extreme events may cause overstocking of community pastures which could result in overgrazing (declining biodiversity)	High	2	2	2	3	1	5	L
	A decline in forage production will result in MAFRI needing to provide continued support and extension of community pasture programs		2	1	1	3	1	1	L
	Increasing invasive species resulting in need to increase surveillance and extend control measures (e.g. Herbicides and potential impacts)		1	3	3	3	2	2	L
	Extreme events leading to a lack of stability and increased financial risk will require insurance programs to have increased funding and capacity		4	5	4	4	4	4	H
	Climate change will cause current programs to be ineffective and strategic planning will have to change		3	3	3	2	2	3	M
	Current location of offices may change due to change in farming practices (shifting vegetation patters and forage production moving north)		3	1	2	2	2	2	L
	Change in temperature trends will favour weed species and result in reduced yield and higher management costs MAFRI will have to provide more extension and research support to educate producers		2	3	3	2	2	3	M
	Decrease in yield and increase variability will boost the demand for financial support and resources		5	5	4	2	2	5	M
	Decreased yield will result in increased pressure for crown land management		4	5	4	3	2	3	M

AFTERNOON SESSION: December 1st, 2011

Test Lab 4: Adaptation Options

Over the lunch period Dr. Jeff Thorpe continued on with his presentation from the previous day which highlighted potential adaptation options for grasslands in Manitoba. This provided some background information for the afternoon session which focused on identifying adaptation options MAFRI to adapt to the climate impacts on the cattle and forage sectors. Table 5 below highlights the adaptation options from all 5 breakout groups sorted by category.

Table 5: Adaptation Options for MAFRI to Support Adaptation within the Beef and Forage Sectors

Adaptation options	Timeline for implementation	Department(s) responsible
Maintenance of water quantity and quality		
Preserve water quantity and quality (agronomy and breeding)	Agronomy (1-5 years) Breeding (10+ years)	MAFRI/ Water Stewardship
MB Water Strategy (new and improved)	5 years	Interprovincial, International
Inspection and monitoring of water quality	Immediate	Local, Prov & Fed, NGO
Water availability strategy for cattle	1-2 years	Lead – MAFRI & WSD
Native Grassland Initiatives		
Sustainable forage management to maintain native and tame grasslands	Immediate – no net loss	MAFRI/ Conservation/ Private
Promote programs to maintain native grasslands. Management of conservation agreements.	1 year	MAFRI, MHHC, Nature Conservancy
Expanded native species seed supplies	10 years	MAFRI and Conservation together
Use wetland restoration program funding for EGS programs instead since its cheaper (* cheaper to maintain than re-create grasslands)	5 years	WS, MAFRI, Cons with DUC
Programs for management burning of native grasslands, prevents wildfires	5 years	Municipalities with MAFRI and Cons
Disease Prevention and Planning		
Surveillance and monitoring of diseases	Immediate (0-5 years) and long term (5-10 years)	MAFRI/ MHHL

Staff training on disease prevention	Immediate and long term	MAFRI/ MB Communications Group
Monitoring program for existing and emerging diseases	Now	MAFRI, EC
Develop emergency response for potential outbreak -> adapt to new threats	1-2 years	MAFRI, WSD
Develop a disease prevention plan with cc aspects	2-3 years	MAFRI
Planned grazing management programs (herd health benefits)	Now	MAFRI
Wetland Maintenance and Restoration and Flood Prevention		
Regulate loss of wetlands	Now	Water stewardship/ MHHC ->Conservation agreement
Change crop insurance: stop making flooded acres payments to areas where wetlands are drained (i.e. potholes)	April 2012	MAFRI and MASC
Use wetland restoration program funding for EGS programs instead since its cheaper (* cheaper to maintain than re-create grasslands)	5 years	WS, MAFRI, Cons with DUC
Soil moisture monitoring/ surveillance	3-5 years	MAFRI/ WS/ UofM
Coordinated drainage policy	10 years	MAFRI, WS, Local Gov't, IntraProvincial International
Community Pastures and Crown Lands Initiatives		
Maintain and improve existing Crown lands and existing government –owned community pastures	Now	MAFRI/Conservation
Crown land	Immediate and long-term	MAFRI/Conservation
If Crown land will be sold caveats should be in place to maintain wetlands, native grasslands and riparian areas	5 years	MAFRI and Conservation and WS
Conservation purchases land when it comes up for sale – land that has important ecological value	Ongoing	Cons
Soil Survey Expansion		
Soil survey data – expansion (detailed)	Now to 20 years+	MAFRI, AAFC
Improve soil mapping and analysis for future land use planning	5-10 years	MAFRI

Cattle Breeds and Breeding		
Heritage breeds (highland cattle – more resilient, needs less water, healthier)	Long-term	MAFRI
MAFRI education program on adaptive capacity of alternative cattle breeds	Within 3 years	MAFRI in collaboration with AAFC and other provinces
Other Forage Related Adaptation Options		
BRM programming to incent sustainable crop rotations (e.g., annual poly cropping perennial grains)	5-10 years	MAFRI
Long term funding programs for forage research (variety breeding and adaptability)	Now	MAFRI/ AAFC/ universities
Risk reduction programs (e.g., feed storage)	5+ years	MAFRI policy group
Change crop insurance: pay for fences around hay storage rather than paying for losses to wildlife (Hay yards for Habitat)	Jan 1 2012	MAFRI and MASC
Perennial grains/ poly culture	10 years	MAFRI, UofM, International
Maintain quality forage lands (e.g., fund research, land use planning, and education)	2-3 years	MAFRI, Crown lands, LG, Local Min, CDs
Find the ideal grass – Research i.e., grass that is naturally resistant and also ensures optimal cattle production w Kansas/ Nebraska	5-7 years	
Other Cattle Related Adaptation Options		
Extend ASI and ARDI to support R&D	Immediate	MAFRI
Livestock corridors to provide shade and biodiversity	Now	MAFRI/Conservation
Livestock herd demographics	Next 5 years; min annual basis	MAFRI, sector
Integrated production system closed loop	Now and ongoing	MAFRI, IISD, WS, Lake Wpg
Other Adaptation Options		
Regulate urban expansion	Now	Local government
Range land health assessment guide	1-5 years	MAFRI/ Conservation/ Water Stewardship/ AESB

LiDar expansion (hardware/software)	10 years	MAFRI, WS, Local government
Adaptive Policy Review	Progressive and ongoing	All depts.
EGS Policy and Program	2-5 years	MAFRI, WS, Cons, Conservation Districts plus Sector
Expansion of Conservation District programming	10 years	As above
MSAPP	10 years	MAFRI, AAFC, Sector
Climate Adapt Research – MB Specific	10 years	MAFRI, UofM, UofW, AAFC-BRC, etc.
Expansion of Internet/ Communications infrastructure (4G)	2-5 years	Fed/Prov
Info gathering for extreme events -> network with Kansas	1 year	MAFRI
Enable more applied research into policy and planning. Network with academics	Now	UofM, and others, BU, ACC
Network – interdepartmental and between provinces	Now	MAFRI, WSD, CON, LG, Sask Ag, AB Ag, etc.
Hire new adaptation staff or reassign	Now to 2 years	MAFRI
Align new innovation technology to mitigate cc	1 year	IEM, MAFRI
EGS incentive programs	5 years	MAFRI/ Cons/ Water St
EGS regulations	As above	As above
Training and development of staff to build capacity for climate change adaptation	Expand current activities	MAFRI and Cons individually

Each breakout group provided feedback on the process of identifying adaptation options. A summary of the feedback is provided below:

- Again, producers, program managers and experts in the field should be involved in this process, representation from other departments is also necessary.
- How can innovation in agriculture be brought in?
- Communication with MAFRI executive is necessary. It is not effective to wait until the end of the process.
- MASC, NGOs, MHHC, Livestock commodity groups, Forage council, researchers
- More multi-department workshops with on-the-ground staff to build relationships with those staff that will implement adaptation strategies
- More information on policies in place

- This will require a lot more time, meetings and focus groups to produce effective results
- We are missing outcomes of current programs
- Climate scenario modeling for agro Manitoba is the basis of the evaluation.
- Literature review of impacts to the various sectors under MAFRIs mandate
- We should consider "no-regrets" policies due to the uncertainty surrounding climate projections and impact. Should select programs with other co-benefits besides adaptation.

Tony Szumigalski policy analyst with MAFRI concluded Day 2 of the workshop by thanking all participants and presenters. He mentioned that the results from this workshop would be used in part for the development of an adaptation strategy for MAFRI.

Lessons Learned and Next Steps:

Overall, participants felt that the development of an adaptation strategy was an important initiative for the various provincial departments to have in place to mitigate future impacts of climate change. It was noted that we (i.e., public, producers, politicians) are caught in "crisis mode" and there is a lack of funding for staff to take on long-term projects which in turn leads to limited proactive programming. Business risk management programming was said to dominate political budgets (70-90%) leaving less funding available for adaptation.

Participants agreed that it is important that we include a wide variety of government of Manitoba employees and stakeholders (NGOs, producer groups, academics, etc.) that can identify the major issues within the agriculture, food and rural sectors. This process will likely be completed from the bottom-up, however it is important that there is support from executive and that they are updated on a regular basis with regards to the progress of the strategy. For this process to be effective, it must be included as part of the 10-year strategic plan and funding must be available to implement the strategy following the planning process.

Initial assessments should be done using focus groups composed of MAFRI employees, and stakeholders (producers, producer groups, NGOs, researchers) that are experts in the given sector. Following the initial assessment it would be necessary to include other departments (MWS, CON and Federal Government employees) to determine how the adaptation options may be implemented or how they may conflict with the other departmental mandates. It was highlighted multiple times throughout the workshop that interdepartmental collaboration was necessary, and an interdepartmental adaptation team should be created to organize these collaborative efforts.

Feedback regarding the use of the applied framework for Manitoba's adaptation planning purposes was that the framework too technically intense, it does not provide quantitative results, it was difficult to relate the process to the departmental objectives and the timeline, and the vulnerability and risk assessments did not build off one another. The development of risk statements also seemed somewhat random and did not appear to capture all the issues of the various sectors being evaluated. This being said the process was undertaken as more of a "test case" and does not reflect actual application of the framework. In the future, MAFRI along with

other provincial departments may decide to proceed using a different adaptation framework more suited to the needs of Manitoba. Suggested options for alternate frameworks are:

- Simplified sector based risk assessment (i.e. no vulnerability assessment performed and less focused on individual ecosystem services) – Follows ISO 31000
- Survey based assessment of major issues and gaps in programming from MAFRI experts and stakeholders
- UKCIP Adaptation Wizard

A second workshop will be held in January with various stakeholders (producer groups, academics, etc.) to receive their input of the development of an adaptation strategy and the initial outputs obtained from this GOM adaptation workshop. Following this half day stakeholder workshop, decision makers will meet again to discuss necessary modifications to the SRD framework in order to increase its effectiveness in Manitoba and the possibility of proceeding with a different framework entirely will also be discussed.

The MAFRI adaptation team specifically will be reviewing various frameworks and the feedback from the two workshops in order to decide which framework is best suited to the organization. MAFRI's adaptation team will be consulting with specialists within MAFRI, and other provincial departments to determine the sectors within MAFRI's mandate that are considered most at risk from the impacts of climate change. It will likely be these sectors that are assessed first off and for which adaptation options are developed.

Future meetings will be required to determine how this process fits into the provincial and departmental planning process.

Appendix A – Participants

Greetings: Barry Todd (DM MAFRI), Fred Meier (DM CON)

Steering Committee: Randall Shymko (CON), Tony Szumigalski (MAFRI), Ainsley Little (MAFRI), Matthew Wiens (MAFRI), Ramon Sales (CON), Scott Stothers (MAFRI)

Presenters: Jeff Thorpe (SRC), Danny Blair (U of W), Paul Bullock (U of M)

Facilitators: Geneva Claesson (Deloitte), Joyanne Lizotte (Deloitte),

IISD: Jo-Ellen Parry Susan Taylor

MAFRI: Marla Riekman, Shane Tornblom, Rob Berry, Pam Iwanchysko, Glenn Friesen, Brittany Dyck, Elaine Gauer, April North, Eric Liu, Prabal Ghosh, Kim Brown-Livingston, Esther Salvano, Mike Lesiuk, Carolynn Osborn

Conservation: Dan Chranowski, Jessica Elliott, Jim Duncan

Local Government: Chris Leach

Water Stewardship: Alexandra Bourne, Rhonda McDougal

Appendix B – Workshop Agenda

AGENDA – Day 1:

8:30 – 9:00 a.m.	Registration , Coffee/Tea, Muffins
9:00 – 9:15 a.m.	**Agenda and Workshop Purpose & Outcomes** Geneva Claesson - *Deloitte*
9:15 – 9:35 a.m.	**Welcoming Remarks** • Dr. Fred Meier - *Deputy Minister, Conservation* • Dr. Barry Todd - *Deputy Minister, MAFRI*
9:35 – 10:10 a.m.	**Current and Projected Temperature and Precipitation Trends in Manitoba** • Dr. Danny Blair – *University of Winnipeg*
10:10 - 10:45 a.m.	**Future Impacts to Forage and Grassland Sectors** • Dr. Jeff Thorpe – *Saskatchewan Research Council*
10:45 – 11:00 a.m.	Health Break
11:00 - 12:15 p.m.	**Organizational Risk Management: The Alberta SRD Climate Change Adaptation Framework** • Geneva Claesson **-** *Deloitte*
12:15 – 1:15 p.m.	**Networking Lunch** Lunch Keynote (12:45): **Future Impacts to Manitoba's Crop Sector** • Dr. Paul Bullock – *University of Manitoba*
1:15 – 1:30	**Test Lab - Step 1: Scope and Preparation** • Geneva Claesson **-** *Deloitte*
1:15 – 3:00 p.m.	**Test Lab – Step 2: Organizational Vulnerability Assessment** • Group work to test the Climate Change Adaptation Framework
3:00 – 3:15 p.m.	Health Break
3:15 – 3:45 p.m.	**Test Lab – Step 2: Recommendations for Manitoba** • Group work to test the Climate Change Adaptation Framework
3:45 – 4:15 p.m.	**Group Discussion: Results and Recommendations** • Geneva Claesson and Joyanne Lizotte – *Deloitte*

4:15 – 4:25 p.m.	**Tomorrow's Agenda** • Geneva Claesson - *Deloitte*

AGENDA – Day 2:

8:00 – 8:30 a.m.	Coffee/Tea, Muffins
8:30 – 9:00 a.m.	**Today's Agenda and Q&A** • Geneva Claesson – *Deloitte*
9:00 – 10:30 a.m.	**Test Lab – Step 3: Risk Assessment** • Group work to test the Climate Change Adaptation Framework
10:30 – 10:45 a.m.	Health Break
10:45 – 11:15 a.m.	**Test Lab – Step 3: Recommendations for Manitoba** • Group work to test the Climate Change Adaptation Framework
11:15 – 12:00 p.m.	**Group Discussion: Results and Recommendations** • Geneva Claesson and Joyanne Lizotte – *Deloitte*
12:00 – 1:00 p.m.	**Networking Lunch**
1:00 – 2:45 p.m.	**Test Lab – Step 4: Adaptation Options** • Group work
2:45 – 3:00 p.m.	Health Break
3:00 – 3:30 p.m.	**Test Lab – Step 4: Recommendations for Manitoba** • Group work
3:30 – 4:00 p.m.	**Group Discussion: Results and Recommendations** • Geneva Claesson and Joyanne Lizotte - *Deloitte*
4:00 – 4:15 p.m.	**Closing Remarks** • Tony Szumigalski, *MAFRI*

Appendix C – Terms of Reference for the Vulnerability and Risk Assessment

Prior to the workshop the Steering Committee developed the terms of reference for the workshop. They are as follows:

- **Driver** – MAFRI Adaptation Strategy
- **Objective** – Conduct a high-level assessment of vulnerability and priority risks associated with cattle and forage production on Manitoba's grasslands in order to identify potential adaptation options for MAFRI to respond to future impacts of climate change.
- **Participants** – Representatives from MAFRI, PRAC, Conservation, Water Stewardship and Local Government
- **Boundaries** – Organizational: All policies and programs related to cattle and forage production in Manitoba); Geographic: grazing and forage lands within Agro-Manitoba; Climate change horizon: next 30 - 40 years; Adaptation horizon: next 10 years.

Appendix D – Provincial and federal policies and programs in place that may assist with adaptation

Initiative/Program/Policy	Objective	Activities	Instrument Type	Time Frame	Lead
Agricultural Sustainability Initiative (ASI)	Improve agricultural ecosystems in Manitoba by encouraging adoption of sustainable practices	Financial incentives for demonstrations of technology transfer projects or sustainable agriculture practices	Extension; Information	2009-2013	MAFRI
Agri-Extension Environment Program	Changes in practice to encourage the adoption of environmentally sustainable agriculture practices	Extension	Extension	2009-2013	MAFRI
Agri-Food Research and Development Initiative (ARDI)	Provides funding for research and development in agri-food production and processing in Manitoba	Provide an avenue for research and development for projects that result in new farm income streams, growth in the value-added sector, reduced costs for primary production and also those that expand knowledge, translate knowledge into new products and practices, or verify new technology and practices under Manitoba conditions.	Research & Development	2009-2013	MAFRI
Agri-Recovery	Help affected producers resume business operations and/or take actions to mitigate the impacts of a natural disaster as quickly as possible.	Payments to producers who have suffered from a natural disaster.	Financial assistance	2009-2013	MAFRI
Agri-Stability	Provides support when a large margin decline is experienced.	Payments to producers who suffer a large margin decline.	Financial assistance	2009-2013	MAFRI
Community Pastures Program	To provide off-farm grazing and to encourage alternative uses of farm land and expansion of herds.	Provides pasture services at cost to livestock producers.	Pasture services at cost	Ongoing	MAFRI & AAFC
Conservation Districts Programs	Empower local people to manage local land and water resources	BMPs, education, implement IWMPs	Incentive programming, education, technical support	Ongoing	Water Stewardship
Consevation Agreements	Permanent protection of welands, uplands, riparian areas and habitats demonstrated to be important to threatened and endangered species (SARs), with an emphasis on grasslands in southwestern Manitoba	Voluntary, permanent conservation agreements (easements) that run with the land.	Conservation Agreements (perpetual)	Ongoing	Manitoba Habitat Heritage Corp. (MHHC)
Critical Wildlife Habitat Program (CWHP)	The CWHP goal is to identify, preserve and manage remaining critical habitats, especially native grasslands and habitats of unique, rare and endangered species	Activities include development of species and landscape priorities for Manitoba, development and review of projects, review and recommendation of project funding. Mixed-grass Prairie Projects - Inventory and grazing demonstration projects.	Project funding; extension	Ongoing	Conservation

Drought Management Planning for Manitoba	To develop indicators and strategies for managing short, medium and long term drought including assuring resiliency for long term events associated with climate change	Collecting background information, analysis and identification of potential indicators for different types of drought, public consultation and development of draft drought management plan.	Information	Ongoing	Water Stewardship
Environmental Farm Action Program (EFAP)	Improved environmental performance and sustainability	Producer incentives for BMP adoption	BMP Incentive; Extension	2009-2013	MAFRI
Environmental Farm Plan (EFP)	Identify and reduce on-farm environmental risks	Information workshops, workbook completion and EFP verification	Extension; Information	2009-2013	MAFRI
Extremes of Moisture Response Team	Compile and communicate drought and excess moisture conditions to higher level decision makers	Provide regular updates on flood/drought conditions across Manitoba, assess current and potential impacts on livestock and crop production and facilitate programming requirements	Information	Ongoing when needed	MAFRI
Forage and Beef Research					
Integrated Watershed Management Planning (IWMP)	Create common goals for the watershed and a prioritized and targeted action plan	Public consultations, technical and advisory support	Planning; Incentives; Education	Ongoing	Water Stewardship
Livestock Manure Mortalities Management Regulation (LMMR)	The primary objective of the Livestock Section is to ensure consistent administration of the LMMMR across the province.	Regular inspection of storage facilities for manure and mortalities, inspection of manure storage facilities during construction, investigation of complaints, response to reports of manure spills and enforcement of regulations	Regulation	Ongoing	Conservation
MAFRI Growing Opportunities (GO) Teams	Provide front line service for MAFRI to the agricultural community in Manitoba	Provide agricultural extension, support and assistance to agricultural producers and industry	Extension; Information	Ongoing	MAFRI
Manitoba Agricultural Services Corporation (MASC)	To support the Manitoba's producers and rural communities, through innovative and targeted risk management and financial programs	Provide a variety of lending and insurance programs for agricultural producers in Manitoba	Loans; Insurance	Ongoing	MASC
Manitoba Agriculture Weather Program	Improve weather monitoring across agro-Manitoba and to develop agronomic decision support tools. These tools enhance risk management and input efficiency.	Establish climate stations and up to date information and tools for more effective weather forecasting	Information	Ongoing	MAFRI
Manitoba Sustainable Agriculture Practices Program (MSAPP)	On-farm climate change mitigation and adaptation	Funding to cost-share BMPs; R&D projects	BMP incentives; Extension; information	2008-1012	MAFRI
Protected Areas Initiative (PAI)	PAI contributes to long-term sustainable development by assembling a network of core protected areas designed to conserve ecosystems and maintain biodiversity across Manitoba.	Establish, for each of the 18 natural regions and sub-regions of the province, a network of protected areas containing an adequate and representative sample of the region's diverse landscapes	Regulation	Ongoing	Conservation

Provincial Flood Mitigation Strategy	To develop a province-wide flood mitigation strategy for flood proofing flood prone communities and individual residences	Flood forecasting initiatives, construction of dikes, feasibility assessment of flood infrastructure and other flood mitigation activities	Information; infrastructure	Phase 1 initiated in summer of 1997	Water Stewardship
Provincial Land Use Planning	To express the provincial interest in the use of land and resources to provide guidance to local planning authorities in the preparation of local land use plans	Advice and education to local planning authorities regarding the preparation of land use plans that integrate social, environmental, economic, and cultural considerations and support community sustainability	Extension	Ongoing	Local Government
Riparian Tax Credit	Encourage green practices on riverbanks and lakesides	Applicable to agricultural land only	Tax Credit	Renewed annually since 2003 (5-year agreements)	Manitoba Finance
Strategic Directions for Water	Three year action plan to develop policy and recommendations for Canada wide water strategy to protect aquatic ecosystems, promote wise use of water, water quality and water quantity management, adaptive strategies to reduce impact of climate change.	Promote positive changes to conserve water and water quality, transition science into policy, develop water valuation and guidance document for water managers. Develop tools to facilitate sharing of water data Canada-wide. Identify and share BMPs	Information	2010-2013	Water Stewardship
The Manitoba Benchmark Project Crown Lands	Verification of crown lands classification and provide basis for crop and livestock extension.	Monitor forage yield and quality on historically grazed native pasture in Manitoba taking into account different soil types and 4 different eco-regions in Manitoba.	Information	Introduced for 2004-2008; Ongoing	MAFRI