

**Community capacity considering climate changes in drought and wind
regimes in New Brunswick's forests.**

by

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Abstract

In Atlantic Canada, climate change is affecting forest dependent communities and the livelihoods of those who live there. This report analyzes the resilience of two forest dependent communities; Doaktown/Blissfield and Nackawic/Southampton, by focusing on the communities' capacity to deal with the changes. For this purpose, I measured several social indicators such as population, income, mobility and employment, through data obtained from Statistics Canada. Also, I interviewed the preselected participants from both communities. Then I conducted a comparison study between these two approaches to understand the resilience of these two communities. Furthermore, I completed a quick scan of conditions of 18 jurisdictions in New Brunswick that were forest-dependent in 2001, but which were no longer forest-dependent in 2016. This scan was done by examining data obtained from Statistics Canada. All these data provided a significant amount of information about their present socio-economic conditions and the resiliency to adopt to the effects of climate change.

Introduction

Climate change has become a global concern over the last few decades because of its various effects on earth and society. It has effects on air temperature and precipitation which can amplify various natural disasters. All these changes have an impact on human civilizations. These days many communities are suffering from various consequences created by climate change. This research has a relationship to this fact of climate change and its effects on different forest-dependent communities in the province of New Brunswick (NB). The main concern is not only how climate change affects the community capacity but how community capacity allows communities to effectively deal with climate change.

Forests are an important feature of New Brunswick's landscape and many people are dependent on forests for their livelihood. In 2001, there were 30 forest-dependent census subdivisions in New Brunswick but in 2016 there were only 12 of them. So, the 18 other forest subdivisions are considered as no longer forest dependent. It means that there was almost a 77.35% reduction in the number of these communities which highlights a significant reduction of forest dependency. For this research, I chose two clusters of paired communities that are forest-dependent communities. They are Doaktown/Blissfield and Nackawic/Southampton.

Objectives

This research aims to assess climate change adaptation and community capacity case study on forest-dependent communities in New Brunswick (Doaktown/Blissfield and

Nackawic/Southampton). The main objective of this report is to assess the socio-economic conditions of the communities in Doaktown/Blissfield and Nackawic/Southampton forests. It will analyze the resilience of these communities by focusing on the communities' capacity to deal with changes. The second research objective is to analyze community members' understanding of climate change and its effect on the resilience of these communities. In order to understand the present conditions in these communities, I conducted interviews with Doaktown/Blissfield and Nackawic/Southampton residents. In addition, the third goal of this research is to do a quick scan of conditions in 18 jurisdictions in New Brunswick that were deemed forest-dependent in 2001, but which were no longer deemed forest-dependent by 2016.

According to the demographic profile (2005), the town of Nackawic is located 65 km west of the city of Fredericton on the north bank of the Saint John River in New Brunswick, Canada. The Mactaquac Dam and the St. Anne-Nackawic Pulp mill were two major installations that had a significant impact on the local economy. In 1966, the Provincial government decided to build a hydroelectric dam across the Saint John River at Mactaquac to increase the power supply to the southern New Brunswick residents. When the dam was built, the Saint John River valley was flooded from Mactaquac to Southampton. From 1970 to 2004, St. Anne-Nackawic Pulp Mill operated there, and it was the major source of employment for the local people. In 2004, an economic crisis occurred due to the unexpected closure of the St. Anne-Nackawic mill which abolished 400 jobs for regular workers. An additional 65-75 forest workers lost their jobs. (Town of Nackawic demographic profile, 2005).

According to Mark Smith (2011), an adjustment committee was formed to help those affected by the mill closure adjust to the new reality in Nackawic. Additionally, the unionized workers voted to work without pay to complete the repairs that had been abandoned during the closure so that it could begin operations when the new buyer could be found. The provincial and federal governments agreed to fund the work, and it was eventually carried out, but the workers did not receive full payment for their hard work. Finally, there was an agreement between Tembec Inc. and an Indian business conglomerate Aditya Birla Group to purchase the mill. Nackawic Community Report by Mark Smith, (2011) reveals that the mill reopened on January 16, 2006, as AV Nackawic/Southampton group and it is currently running effectively.

According to the Village of Doaktown history (2016), The Village of Doaktown is situated almost in the middle of New Brunswick on Route 8 (The Miramichi River Route) which cuts diagonally through the center of the province. Approximately 45 minutes to the southwest side of this village is the City of Fredericton. The forest industry is the primary source of income for many residents and has been since the early 1800s. Also, other natural resources such as rivers, salmon, wildlife, and spectacular scenery have also made this area a great tourist destination. Notably, the greatest influence of Squire Robert Doak, the local community became known as “Doaktown” in 1868. His family arrived in Doaktown from Ayrshire, Scotland in the early 1820s. They owned lumber mills, held a variety of public positions, and were the settlement’s largest employer. There were different ownerships of the mills at different times. Currently, the sawmill is owned by JD Irving Limited and it mostly processes pine lumber. Although, it is a great source of employment for the people

of Doaktown, however other data concerning all other types of employment was not accessible.

Literature review

The purpose of the literature review is to provide background on community capacity, community resilience, past research on climate change and its effects on targeted communities.

Community Capacity

According to Beckley, Martz, Nadeau, Wall, & Reimer (2008), the concept of community capacity is closely associated with community development. Each community has their own potential capacity to face various challenges by using their local resources, energies and synergy (p. 59). It is actually the collective achievement of the members of a community as a whole. There could be various challenges in any community such as socio-economic challenges, environmental challenges, etc. On this matter, Beckley et al. (2008) declared that for the greater development of the community, the collective approach of the group members involves several multiple facets such as the capital assets, catalysts, mobilization of those resources through social organization and the end results. That is why the community capacity could be defined as the collective ability of a group to combine various forms of capital within institutional and relational contexts to produce desired outcomes (p.60).

Beckley et al. (2008) stated that community capacity can be described at the macro-level or, in micro-level but it depends upon the approaches of the different levels of

individuals of a community. For instance, policymakers and external community analysts mostly prefer the macro-level whereas local residents may prefer a micro level approach to share the broad vision of capacity. Subsequently, the main target of describing the community capacity is to deliver positive outcomes to focus on the long-term solutions for issues (p.61).

To simplify the concept of community capacity, Beckley et al. (2008) showed a conceptual model to better understand some phenomena. This model represents how four forms of capital/resources (social, economic, natural & human capital), catalysts (opportunities and threats), four overlapping relational spheres of interaction, and capacity outcomes are related. It also depicts the interactions of four overlapping domains occurring, where the organization and mobilization of the resources take place. This mobilization can result in an infinite number of outcomes such as maintaining economic vitality and civic vitality, linking to the global economy, maintaining ecological integrity, human health, and so on (p.62).

In this research paper the community capacity of two different forest-dependent communities will be discussed in terms of their ability to face climate change challenges. It will also focus on various resources that are at risk because of various issues.

Communities and Resilience

According to Varghese, Krogman, Beckley, & Nadeau (2006) community resiliency refers to the adaptability of the communities at the time of vulnerability (p.508). It is primarily the abilities of the people of the community to tolerate and adjust to various challenges that are present. Varghese et al. (2006) stated that community

resiliency is mainly associated with the concept of community well-being and community capacity (p.509). That is why the resiliency of a community depends on the positive outcome of human behavior. Beckley, Parkins, & Stedman (2002) mentioned that human resiliency can be measured by creating a community level index. This index can be built from primary data such as resident's perceptions of visual attractiveness, proximity to outdoor facilities, level of civic involvement, the effectiveness of community leaders, economic diversity, and social consistency of the residents (p.634).

Joseph and Krishnaswamy (2010) mentioned about 15 resiliency factors that contribute to successful community transitions. They identified those factors of resiliency for forest communities in transition within the province of British Columbia. Some of them are economic diversity, financial resources, natural resources, local control over the enterprise, policy influence, good governance, human capital, social capital, attitude, geography, health, and so on (p. 130). They compared and contrasted two local forest communities depending on these factors to identify the community capacity. The outcome showed significant overlap because many of these factors are inherently interrelated (p.130). In this report, some of the relevant factors will be discussed in a broad term to compare two forest-dependent communities in NB.

Industry and forest-based community relationship

According to Beckley and Reimer (1999), a sustainable forest industry depends on sustainable rural communities (p.803). That means there is a close relationship between the forest industry and rural communities. The socio-economic condition of a rural community mostly depends on the forest sector through some communities also rely on tourism,

agriculture, or mining. Many people in forest-dependent rural communities take jobs as loggers, or pulp mill workers, or logging truck drivers. It is very common that at least one member of each household holds such an occupation (p.806).

Beckley and Reimer (1999) stated that these days rural people are comparing themselves to urban dwellers. That is why they are now more concerned about the better quality of life which can be easily accessible by the modern communication system. Especially, young people are mostly concerned to get access to wealth and facilities (p.806). To gain these opportunities now the young people of the forest-based communities mostly prefer to move away from the rural area when they do not find interesting jobs in the local area. That is why some communities are losing their young population with the closer of local pulp mills or timber mills.

Beckley and Reimer (1999) pointed out that higher rates of forest dependence are associated with lower educational attainment. They also mentioned that people could obtain high-paying jobs in the mills with minimal education and sometimes it requires a high school diploma. Sometimes people work in the same position of job for a very long time (p. 807). All those issues sometimes push an individual to leave the community at his/her early age of time to get better chances in bigger cities. That is why most of the communities are focusing on creating better opportunities for members of the community locally instead of only depending on forest industries in order to avoid a massive exodus.

Climate change risks and vulnerability

Climate change is one of the factors that contribute to extreme weather events such as extreme heat, floods, drought etc. Over the years, forests have adapted to various

changes in a variety of climatic conditions. But the ongoing climate change is creating a vulnerable condition for the forests and all the living species inside the forests. That is why the concept of adaptive capacity has risen in research on the human elements of environmental change. According to Keys, Thomsen & Smith (2016), stated that the idea of adaptive capacity represents the ability of individuals to mobilize their physical and social elements to cope with various climate changes. This situation helps them to adopt various changes and reduce vulnerability (p.433).

On this matter, Gauthier, Bernier, Burton, Edwards, Isaac, Isabel, and Nelson (2014), mentioned that the adaptive capacity of the forests can be enhanced through forest management practices. Similarly, humans have their own adaptive capacity while they work together as a community, organization, and institution. For instance, forest fires in the boreal forest can badly affect the forest composition and timber supply availability or the smoke can create emissions. The forest species have their own ability to cope with this vulnerable condition of forest and forest managers can also adjust by increasing salvage logging which can be recognized as adaptive capacity. Besides the destruction of a large amount of timber supply can be considered as vulnerability (p.258).

Davidson, Williamson, and Parkins (2003), pointed out the potential impacts of climate changes on forest-based communities. Climate change can build levels of risk over an extensive scope of qualities for the inhabitants of networks in forested areas. In this situation, the communities in forested areas become a vulnerable group as they are living in a threatening condition. The potential impacts of climate change involve risk of property, personal health, and safety, various nonmarket use and nonuser values of the forest, and

income. Also, all these associated losses of opportunities reduce the participation of human individuals in various cultural activities. In this situation, social conflicts, and a loss of unity inside the community occur more often which could make the community more vulnerable (p.2254). This scenario is very common in the forest-based communities in Canada. The vulnerability of this type of community can be estimated by considering the particular social context of this community. According to Davidson et al. (2003), five factors can help to define this context. The first three factors relate to community capacities such as the constraints on adaptability in forest-based communities, the identification of deforestation in the political arena and the nature of management and planning for the commercial forestry investment. The two other factors related to the social construction of risk. These two factors are the diversity of climate change risk factors and the conceivable number of individuals from these networks to think little of the risk associated with climate change (p.2256). These factors intend to explain that in a forest-dependent community the forestry company plays a vital role in the local economy while they disregard the environmental risk of deforestation.

Methods

This research has been conducted to acquire new insight into the existing ideas and thoughts on community capacity, vulnerability, resilience, and climate change risks of two different forest-based communities. This research utilizes both qualitative and quantitative approaches as it depends on assessment of existing data, research, and interviews. It will help to contribute and develop the ideas of previous research.

According to Beckley, et al. (2009), the assessment of different community capital assets can provide an essential description of the current situation of different communities. Through this process of assessment all the collected data and the data analysis can help to compare and contrast between communities which can explain the overall capacity of the communities (p.60). Based on this idea in this research a list of elements of the four different community capital assets were deduced. Furthermore, among those assets the ones that are at risk need to be analyzed based on the Statistics Canada Census data.

All of the data were obtained from the official website of Statistics Canada Census data (2016).

According to Beckley et al. (2009), the elements of community capital assets are divided into four categories to assess the community capacity. Those are as per the table below.

Table 1 – List of elements of four community capital assets

<p style="text-align: center;">Economic Capital:</p> <ul style="list-style-type: none"> - Property tax revenue - Municipal infrastructure - Personal savings, Income - Value of real estate - Municipal bond rating - Number of businesses - Stability and success of businesses - Emergency preparedness infrastructure - First Responders infrastructure: fire, policy, ambulance 	<p style="text-align: center;">Social Capital</p> <ul style="list-style-type: none"> - Extent of barter - Participation at events - Number of voluntary associations - Bridging social capital - Bonding social capital - Density of acquaintanceship - Social networks - Public health networks, Health care - Trust-Voting levels
<p style="text-align: center;">Natural Capital</p> <ul style="list-style-type: none"> - Forest resources - Soil resources - Energy resources (renewable/non-renewable) - Amenity values (aesthetics) - Mineral resources - Wildlife resources - Water quality - Air quality - Biodiversity - Ecosystem services 	<p style="text-align: center;">Human Capital</p> <ul style="list-style-type: none"> - Population profile - Education attainment - Dependency ratio - Quality of leadership - Quantity of leadership - Life skills - Trade and technical training - Entrepreneurship - Creativity - Self-provisioning skills

This research will also provide a quick scan of conditions in 18 jurisdictions in New Brunswick that were deemed forest-dependent in 2001, but which were no longer deemed

forest-dependent by 2016. This will be done by examining Statistics Canada Data and by scanning secondary sources for economic data on these communities.

To investigate these topics, I conducted semi-structured interviews with citizen participants in Doaktown/Blissfield and Nackawic/Southampton residents. The questions in this study were qualitative and open-ended in order to get a good understanding of participants' responses on community capacity and their perceptions of climate change. The consent form was sent to 23 potential interviewees in Nackawic/Southampton via email. I also called each of them several times. But most of them did not reply to me back within one week. Only four of them replied back after one week. After waiting for two weeks, I went to visit Nackawic/Southampton for four days to meet and to try to convince people to agree to an interview. Finally, I was able to take seven interviews. Due to the pandemic situation for the COVID-19 virus outbreak, most of the people were not feeling comfortable giving the interview even though I followed the provincial health regulations. Besides, I found a few of the staff were working in different places/organizations and some places were temporarily closed because of the pandemic situation. Due to the limitations in place with the COVID-19 virus, I took one of the interviews via phone call and the rest of the interviews (5 interviews) were in-person interviews. The mode of the interview was decided by the participants based on their convenience. In addition to the seven completed interviews, I found a contact who agreed to arrange a visit of the pulp mill. The manager told the person that he will get back to me as soon as possible but nobody called me back.

A similar situation occurred in Doaktown/Blissfield. The consent form was sent to 12 potential interviewees in Doaktown/Blissfield via email. I spent two weeks calling to attempt to arrange additional interviews, but most places were temporarily closed due to the COVID-19 situation. I kept calling them and left voicemails each time. After waiting for two weeks I went to visit Doaktown/Blissfield for two days and I managed to undertake

7 interviews. One of the interviews took place via phone call and the rest (6 interviews) were in-person interviews. Furthermore, I went to JD Irving mill twice and I convinced two workers to give an interview. But then after one day they called me and canceled the appointment because they were most likely worried about the consequences for their job.

For the scan of formerly forest-dependent communities, I planned to take a limited number of short interviews with town officials (for those jurisdictions that have a local government) from 18 different communities that are no longer considered forest-dependent communities. I managed to collect 7 contact information from different communities, and I tried to contact them. No one responded back to my email or called me back. However, I wanted to visit these places to find potential interviewees but because of pandemic restrictions, I could not go there.

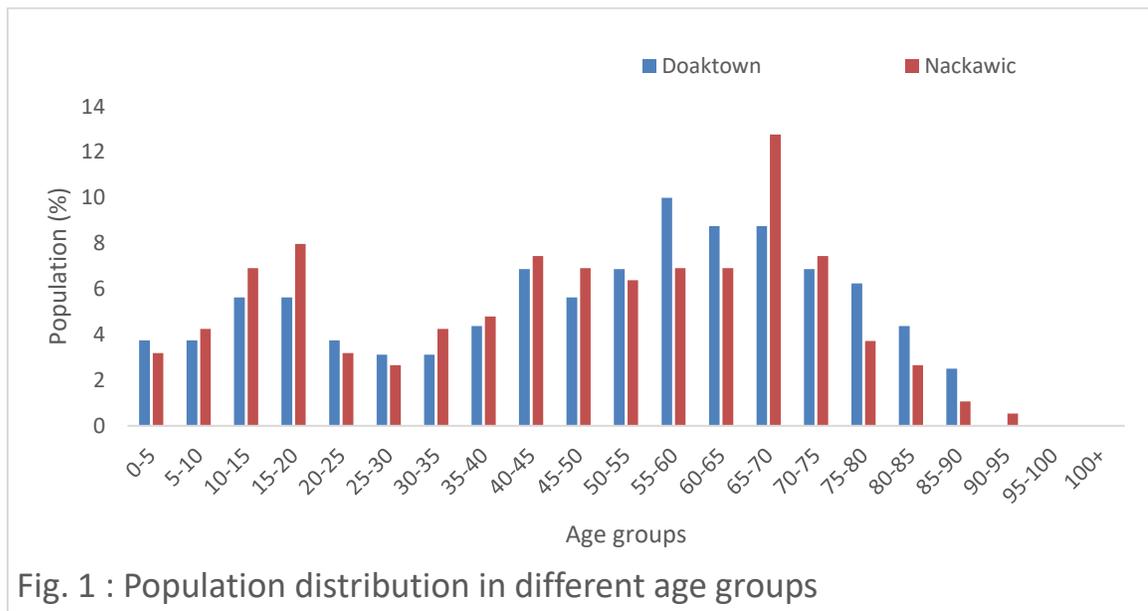
The purpose of these interviews was to understand the perceptions of the local people from both communities about their own community and community capacity. These interviews were intended to help understand their knowledge of climate change effects on the environment and how they faced various challenges as a community.

An interview guide was made with the semi-structured questions which are attached in the appendix section.

Results

Indicators from Statistic Canada 2016 Census

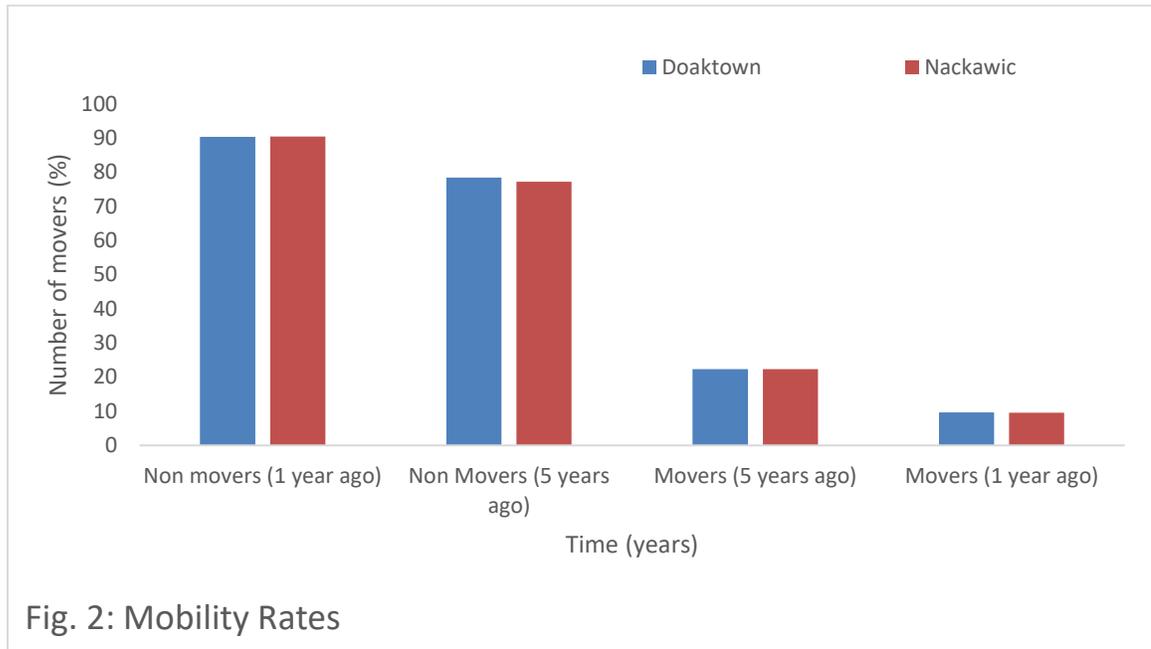
The Census variables that we selected to analyze capacity, resilience and well-being of our case study communities consist of population, mobility, employment, and income. The data was collected from Statistics Canada website 2016 Census.



Population distribution

Figure 1 shows the comparison of the distribution of age categories across the population of Nackawic/Southampton and Doaktown/Blissfield. Nackawic has higher population in the age group from (5-20). The graph also shows that Nackawic/Southampton has higher working-class population than Doaktown/Blissfield as in Nackawic/Southampton, the overall working age group (20-50) population is higher. In Doaktown/Blissfield the percent of senior working age (55-60) population is higher.

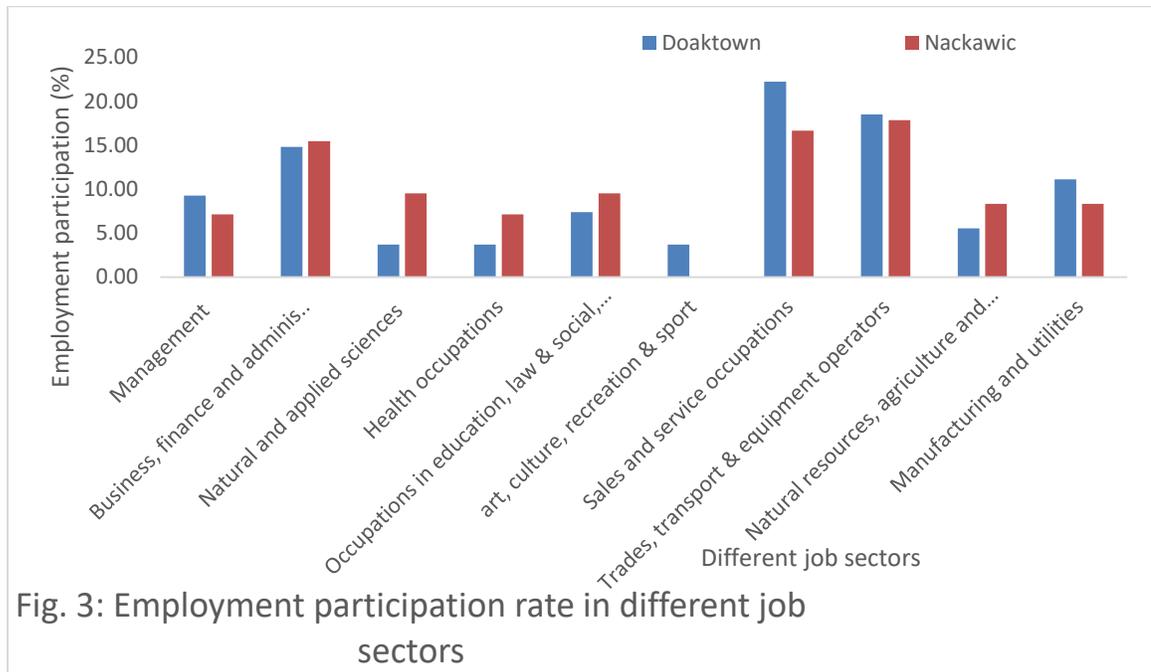
The percent of recently retired people (65 to 75) is very high in Nackawic/Southampton whereas Doaktown/Blissfield has relatively the higher percentage of the older population (70-90 years old).



Mobility Rates

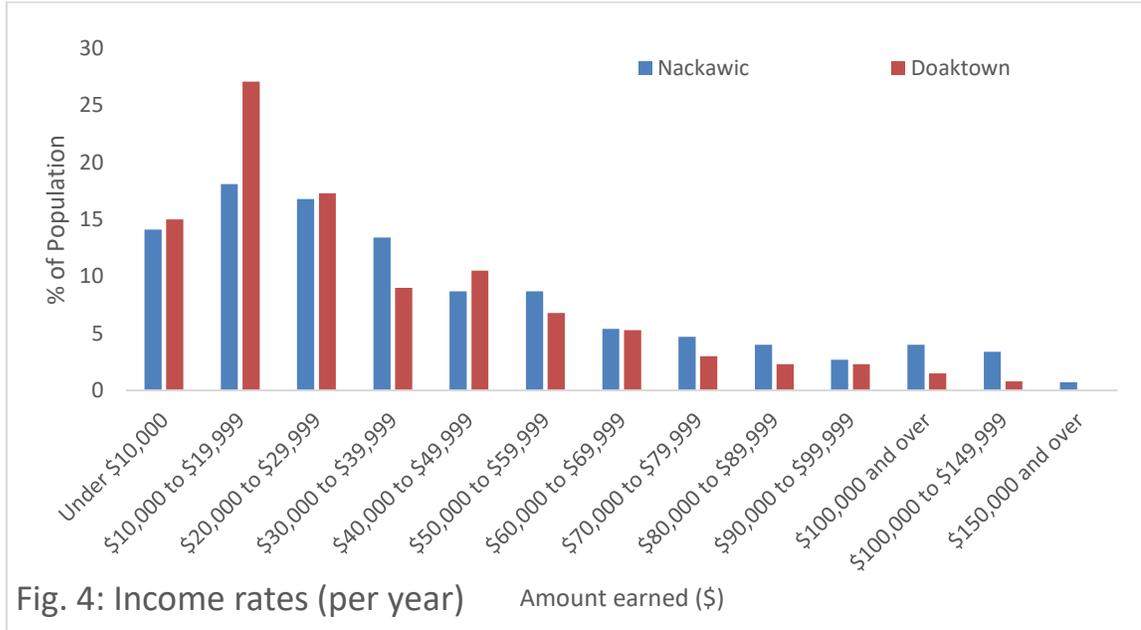
Figure 2 shows that five years ago, around 22.3% of the population moved from both communities (Nackawic/Southampton & Doaktown/Blissfield). According to Statistics Canada data, five years ago province of New Brunswick had 30.9 % movers overall. Therefore, the percentage rates of the movers in both communities (Nackawic/Southampton & Doaktown/Blissfield) are higher comparing to the overall percentage of movers in NB. The percentage of movers reduced a little after that as 10% of the population moved from both communities but still the rate is higher compared to the provincial rate of population migration. Statistics Canada data reveal that one year ago the % of movers stood at about 10% population from both communities while the overall % of

movers rate of NB remained in 11.4%. This situation indicates that both communities are unstable as there is a drastic change of movement of local population.



Distribution of Employment

Nackawic/Southampton & Doaktown/Blissfield are considered forest dependent communities, but in both communities, there are many people working in other sectors than forestry and related sectors. According to Figure 3, approximately 22.2 % of the population are involved in sales and service in Doaktown/Blissfield and relatively around 16.6% of the people in Nackawic/Southampton are working in that sector. The lowest percentage of the people are involved in art and culture sector in Doaktown/Blissfield whereas zero participation in this sector was found for Nackawic/Southampton. Also, the significant participation in trades, transport, business, manufacturing, management, and natural resources are noteworthy.



Income rates

Figure 4 describes income distribution in the case study communities. The highest average incomes are earned by the people of Nackawic/Southampton compared to Doaktown/Blissfield. According to statistics Canada data (2016), 1.3% of people earned more than 150K per year and 18.3% of people earned \$10,000 to \$19,999 per year in NB. It is worth noting that in Nackawic/Southampton there are 0.7% of people who earn more than 150k yearly and no one in Doaktown/Blissfield earns that much. While in Doaktown/Blissfield there are more opportunities for people to earn money from different sectors especially from sales & services, trades, manufacturing, and management, in Nackawic/Southampton the scale of salary is significantly higher. The reason behind this situation could be the larger employment numbers in the Nackawic mill.

In their own voices: Residents' perspectives

In accordance with Appendix 1, the first question that was asked to the interviewees explains the duration of their living in the community (Nackawic/Southampton & Doaktown/Blissfield). Most of the candidates that participated in the interview from Doaktown/Blissfield have been living a long time in the same community compared to interview respondents from Nackawic/Southampton. Five of the participants have been living in Doaktown/Blissfield for about 50 to 69 years. Most of the interviewees from Nackawic/Southampton have been living in this community for about 30 to 40 years. One of the candidates said that he/she has been living in Nackawic/Southampton for three years as he/she has retired from a job recently. Then he/she moved here to live the rest of their life.

The second question relates to the work status of the interviewees from both communities (Nackawic/Southampton & Doaktown/Blissfield). The number of interview respondents who are still working in the community is comparatively higher in Doaktown/Blissfield. Correspondingly, more respondents from Nackawic/Southampton are retired. However, the same number of interviewees are retired but still working in both communities. Two interviewees from each community mentioned that they have retired from their professional jobs, but they are still working for the betterment of the community. Previously they were working as teachers, mill workers, and financial managers, etc. but after retirement, they are working in the town council, community youth program, etc. This work status of the candidates from both communities will be further explained in the report discussion section. [Table 1]

Table 1: Work status of the local interviewees in both communities (Nackawic/Southampton and Doaktown/Blissfield)			
Work status of the people in Nackawic/Southampton	Number of candidates	Work status of the people in Doaktown/Blissfield	Number of candidates
Working in the community	2	Working in the community	4
Retired	2	Retired	1
Retired but still working in the community	2	Retired but still working for the community	2

The respondents were asked to explain their involvement with the local organizations in their community. Three out of seven in Doaktown/Blissfield are not involved with any local organizations and two of them are members of the local church committee. The rest declared their involvement with some other local organizations that are mentioned in [Table 2].

Only two of the respondents (out of six) said that they do not belong to any local organizations. The four other candidates mentioned their involvement with other local organizations. [Table 2]

Name of the organizations in Doaktown/Blissfield	Number of candidates that are involved	Name of the organizations in Nackawic/Southampton	Number of candidates that are involved
Town council	1	Town council	1
None	3	None	2
Doaktown community school library	1	Golf club	1
Church	2	Hiking club/group	1
Atlantic salmon Museum	1	Parks Canada	1
Doaktown Historical society	1		

The interviewees were able to explain how things get done in their communities. They also explained how people came together and accomplished something positive. An interviewee who is a member of the town council in Nackawic said that the community council and Mactaquac Region Chamber of Commerce assists in the financial development of the community. The economic development committee works to deal with any financial conundrum. The revenue of this municipality comes mostly from property tax. The interviewee mentioned that in 2016, the town has suffered a 30% decrease in its revenue, therefore the economic development community worked diligently to increase the revenue. To increase the total revenue from income tax, the town council helped to establish new local businesses. They also decided to improve the waterfront to attract more people to the community which will help grow businesses in the surrounding area. The interviewee mentioned that the council has recently made a grant with respect to the development of the waterfront area. They have also scheduled to start building the senior adult house and

special care home by this year. In accordance with their four years plan, they have started to act upon it. All these initiatives will help them to get better tax benefits, which will help elevate the present financial constraints.

The respondent further mentioned that with respect to the waterfront project the town council hired landscape architectures from Glenn group in Fredericton. This group developed the master plan for the waterfront which was approved by the council to proceed. As it is a small community, it is very important to get public support in this matter. Therefore, the council has two different advisors to understand the public reaction about this project and to take public advice. Some businesspersons are also involved with the economic development committee of Nackawic. A non-profit organization named Destination Nackawic economic development corporation has been set up to help drive this initiative. The chief administrative officer of this non-profit organization works very actively to take care of the public works and recreation infrastructure. In the reserve account, they have five hundred thousand dollars to support all the development activities. Although they get limited financial assistance from the province, they get resources from the 'ACOA' (Atlantic Canada Opportunity Agency) for economic growth.

Another interviewee from the town council has explained that in the Nackawic area many issues get solved by the local churches and clubs. Clubs, in general, do not have paid staff, thus there is a lack of manpower. They organize an event like sponsoring breakfast where they share the profit from it as clubs do not generate their own money. Two of the interviewees mentioned that the wellness community is very organized, and they have accomplished a lot of things for the betterment of the community as they help to solve the problems that the churches and clubs are unable to solve. They host various events like senior meeting groups, wealth behind food programs, food bag distribution, cooking exercise, meditation, and yoga classes. Similarly, community gardens are developed as a

wellness initiative. The food bag distribution program is helping to support the financially poor population within the community. For instance, people pay 16 dollars and they get food worth 45 dollars. Another interviewee who is a retired schoolteacher said that they used to organize different school-level meetings, community support meetings, etc. to help the community and the members of the town council used to attend the meetings as well. Other interviewees mentioned that the local businesses, the pulp mill, etc. contribute to the community as well. That is how things get done in Nackawic from the support of different individuals, clubs, churches, businesspeople, and the wellness community.

Furthermore, when inquired about how people came together and accomplished something positive the following stories and examples were provided. One of the interviewees pointed out to the flag hoisting in 2010. Two of the respondents mentioned that when they figure out there is a cancer patient in the community, and he/she needs financial help then the community raise funds to help that individual. One of the respondents said that if there is an emergency house burn then the neighbors instantly try to help to stop the fire. She also said that in this situation community people also get benefits from the Medical trust funds. Another interviewee added that some individuals in this community donated money to fix and prepare the local tennis court.

Two of the interviewees stated that when the mill was taken over then the provincial government contributed in different ways to make the entrepreneurs successful. For example, the government gave access to the Crown lands to harvest trees to supply the business. The respondents also mentioned that in 2004 when the pulp mill closed, the government and key businesspeople tried to find ways to provide employment opportunities for the mill workers. Additionally, some local people tried to start new

businesses such as furniture factories, restaurant businesses, etc. which also provided jobs for some local people during the period when the mill was closed.

On the above-mentioned topics, the interviewees from Doaktown provided the following responses. Two of the interviewees from the town council mentioned that in Doaktown the town council helped to raise money for building a health clinic, gymnasiums, a museum, and a library. As mentioned by an interviewee, by raising funds they have managed to collect rare books in the museum that are worth a hundred thousand dollars. He also included that the books came from Vancouver in 2018 and 36 volunteers unloaded the trucks within three hours.

Two of the interviewees mentioned that the town council also organize the 'meals on wheels' program to support the senior citizens. Another respondent said that women are at the forefront of most of the organizations in case of helping the community. She also mentioned the community focus group (experience Doaktown) various non-profit organizations that help to organize festivals and community events etc. All these organizations work very closely with the town council. One of the respondents said that they have a community garden where people can do their own gardening. Three of the interviewees said that things get done by local volunteers as there is a large group of volunteers in the community. For instance, if a family needs to take their child to get an operation done in town then the volunteers raise money to help cover that expense. The respondent also mentioned that because of the COVID-19 situation, they can not organize auctions and dinners, but they still raise funds online. The respondents also added that they have a local food bank to help the financially strained individuals and families.

Regarding facing threats or challenges, three of the interviewees said that people of this community face any kinds of challenges together. For instance, if there is a fire hazard in the forest then the local people and the fire department work together to stop the destruction. One of the interviewees mentioned that during hurricane Arthur under the supervision of the town councillors, the fire department, and local EMO (Emergency Measures Organizations) helped the community quite a lot. He also said that they received some provincial help to restore infrastructure after this natural disaster. For instance, the provincial government contributed some money to repair the culvert on the lagoons, but the money was not enough to fully finish the job. Local workers, fire equipment, and provincial expertise were considered as resources to face this challenge. Another interviewee stated that they had a power outage for nine days due to hurricane Arthur. During that time, neighbors were sharing their generators or, loaning their generators to others. That is how people face various challenges together in this community.

One of the respondents was a councillor in the past who said that the local community raised money for the establishment of a nine-hole golf court, gymnasium (for the students and local people), and museum. Mainly the local people and the provincial government were involved with these projects. Besides the federal government provided money to establish the golf court. The respondent also mentioned that for the establishment of the museum the community had a group of volunteers who used to cut the wood logs and sell them in the market. Then the profit was used to build the local museum. After explaining all these examples, the interviewee added that some of the local people provided money, some people had good skills and some people were really good at dealing with the

government to get those jobs done for the community which can be considered as their community resource.

One of the interviewees who is playing a significant role in the Doaktown historical society said that during the last flooding in spring people helped each other a lot to move things such as canoe and boats back away from the river. She also mentioned that the village council, fire departments, and local EMO also take care of any local issues like that and they provide help if needed. She also mentioned that the natural resource department helps the community during the forest fire as they have proper firefighting equipment. However, they also call the fire department for additional help sometimes. The Doaktown community does not have 24hr ambulance service therefore, ambulances from Blackville or Boiestown are used for this community during emergencies. She added that during any natural disaster the Blackville community helps the Doaktown community with their human power or expertise.

Another interviewee from Doaktown stated that they had a couple of drowning incidents in the river. Whenever this type of incident occurs then the local search party attempt to rescue people from drowning by using their boats. He added that sometimes the fire department and RCMP (Royal Canadian Mounted Police) help them to face this type of challenge as well.

The interviewees explained what they consider as the 'best things' in their community. They chose different options among people, weather, culture, and resources. Six respondents from Nackawic/Southampton mentioned that the best thing about their community is the people and togetherness as people help each other. They also know each other and take care of the community. A few of them also mentioned their culture and

resources as well. Similarly, most of the candidates (6 out of 7) from Doaktown/Blissfield mentioned that the best thing about their community is the kind and lovely people. A small number of candidates mentioned their culture and important local resources that they consider as the best objects in the community.

The respondents from Nackawic informed that the worst things about their community are lack of jobs, young people leaving the community, the problem with housing, self-pride, etc. However, it was further mentioned that people within this community who have the financial means do not assist the needy and they do not seek help from others. On the bright side, people sometimes rely on some local farmers and their neighbours for mutual aids. One of the respondents stated that this community used to fully depend on the pulp mill which can be considered as the worst thing about this community. He added that people suffered a lot for over the four years when the mill was shut down. Therefore, it is important to create other economic opportunities rather than relying on just one local business. Three of the respondents stated that currently people are getting encouraged to start any local business as local people support local businesses in this area. Also, the town council helps the business owners to grow their businesses locally.

Now from the perspective of the interviewees from Doaktown the worst things are the geographic location of this area as it is far away from Fredericton, lack of funding from government, the increasing proportion of the elderly population, poor internet connection, a lack of planning for economic development, younger people are moving away for better opportunities and there is a severe health care problem. I was also informed that people do not get encouraged enough by the government if they want to invest some money in a local business. Two of the respondents stated that they do not have a good internet connection

and people can not work from home because of this issue. Besides, people from different communities are not aware of the resources that they have, and this community does not get enough funding from the government. Therefore, not many people are interested to invest money in this area. On the bright side, the local people are very friendly and helpful. They help each other if they have any emergency issues. There are some local organizations that help old and needy people in this community. That is how mutual aids occur in this community.

The interviewees were asked to explain who is more reliable in the community for solving problems (Nackawic/Southampton & Doaktown/Blissfield). [Table. 3] There were four categories given to the interviewees to consider: friends/ family, volunteers, businesspeople, and government or other institutions on that level. The findings from the interviews show that the highest number of people from both communities chose friends or family first, which means they mostly rely on their families or friends for solving any issues. For Nackawic/Southampton, the second most popular category is ‘Government or institutions at any level’ as three people (half of the interviewees) chose this option after choosing the option of ‘family or friends’. In Doaktown/Blissfield, the second-highest popular category is volunteers. Even some interviewees mentioned their involvement with various volunteering jobs locally. Six of the interviewees from Doaktown/Blissfield also mentioned that they rely on some businesspeople and government in case of dealing with some local issues but that was mostly their third or fourth choice.

Table. 3: For solving problems who do you rely on in this community?			
Nackawic/Southampton		Doaktown/Blissfield	
Categories	Number of interviewees said 'Yes' to the mentioned categories	Categories	Number of interviewees said 'Yes' to the mentioned categories
Friends/family (kin)	5	Friends/family (kin)	7
Volunteers	2	Volunteers	7
Businesspeople	2	Businesspeople	6
Government, institutions at any level	3	Government, institutions at any level	6

I asked the interviewees to explain who people trust in the community (Nackawic/Southampton & Doaktown/Blissfield). [Table. 4] The highest number of interviewees from Doaktown/Blissfield chose the 'individual' option first to answer the question. Five respondents from this community chose 'institution' (mostly church/ local clubs) as the second option. The reason behind choosing this option is that local clubs and churches are always working actively for solving various local issues. Besides they do not ask anything for return from the community as these organizations are non-profit organizations. Then only three of them chose 'government' as the third choice. Four of the respondents (out of six) from Nackawic/Southampton chose the 'individual' option first and then the same number of candidates chose 'institution' as the second option. They also mentioned their involvement with local clubs. I was also told that people do not trust the government for solving local issues in this area. That is why only two respondents chose government as their third choice. Additional discussion on this matter will be detained on the report discussion part.

Table. 4: Who do people trust in this community?			
Nackawic/Southampton		Doaktown/Blissfield	
Categories	Number of interviewees said 'Yes' to the mentioned categories	Categories	Number of interviewees said 'Yes' to the mentioned categories
Individuals	4	Individuals	7
Institutions (your church, community recreation)	4	Institutions (your church, community recreation)	5
Government	2	Government	3

The interviewees in both communities explained whether there are any groups of people (poor, elderly or, newcomers) that are 'left out'. Six respondents from Doaktown/Blissfield mentioned that elderly people are left out the most in their community. Besides two of the interviewees stated that there are poor people in the society whose perspectives are also often neglected. In Nackawic/Southampton, respondents identified poor people in their community as a 'left out' group. In addition, two of the respondents mentioned the elderly people and newcomers as groups that have more difficulty being heard in their community.

The interviewees were asked about the reactions of the residents towards the way the world is changing around them. One of the respondents in Nackawic said that local people do not like any changes, and they are not comfortable getting used to these changes. For instance, people do not like to wear masks during grocery shopping. She also added that people have lots of anger and denial about so many changes around them. Another interviewee said that people react in different ways depending on various events.

Then she added that she is concerned about climate change, coronavirus, world politics, and U.S. politics. She said that she tries to be environmentally friendly and self-reliant as much as possible. One of the interviewees who was a mill worker in the past said that things are tougher than before in Nackawic. Because of rising prices of property now people are leaving the community and this type of change is hard to take for the elder residents.

Another interviewee mentioned that people care about climate changes and they organize meetings to aware the residents about various effects of climate change. In these meetings, the speakers talk about how these issues are going to affect their community in a very challenging way.

The respondents in Doaktown were also asked about the reactions of the residents towards the way the world is changing around. Two of the residents said that the 65 plus age group of people are concerned about social injustice, the pandemic, climate change, and more. One of the respondents added that people notice various natural catastrophes are happening within a very short time which is devastating. Another respondent said that local people are concerned about various changes in this area as their community has changed a lot in the past few years. It is also a matter of concern that young people are leaving town for education purposes or jobs. She added that they are concerned about the reduction of the salmon population and the destruction of forests as well. Two of the interviewees stated that local people are very adaptable to various changes around them as they are wearing masks and doing their regular activities during the time of COVID-19 pandemic situation.

To conclude this section, it could be said that most of the collected information from all these interviews helped to clarify the Statistics Canada data. For instance, the

information obtained from the interviewees helped to identify the differences between the two communities. This information also helped to figure out the reasons behind various changes. The Statistics Canada data shows various changes in population or economic growth in both communities. The collected information from different interviews helped to round out these data.

Environment and climate change related data from interview

One of my interests in undertaking this study was community perspectives and perceptions of climate change, especially on the potential effects of drought and windthrow on local forest resources. Many of our small samples in each community agreed that climate change is a concern to the residents. However, the results were not unanimous and there were two respondents from each community that said people are not concerned about this issue in their communities.

Related to perceptions about climate change, we were interested in residents' perceptions of major environmental changes and consequences over time. All the interviewees from both communities replied that they have observed various major environmental changes and consequences throughout time. They also mentioned some important consequences that they observed at different times of the year. We will explain more about this under the discussion section of this report.

The interviewees substantiated various changes relating to weather-related damage to the trees and forests. This question was asked to the interviewees who retired as forest professionals or are involved in forest industries in Nackawic/Southampton & Doaktown/Blissfield. I asked three candidates from Nackawic/Southampton and two

candidates from Doaktown/Blissfield about this matter and all of them said that they have noticed various changes relating to weather-related damage to trees such as ice damage, storm damage, acid rain damage, etc. Also related to climate change and weather facts, the interviewees were asked if the bad weather affects the working schedule of people or not. They were asked this question to reveal helpful information regarding extreme weather situations in both areas at different times of the year. Three respondents in Nackawic/Southampton and one respondent in Doaktown/Blissfield said that their working schedule was affected by various extreme weather situations such as heavy rainfall, flooding, etc.

The interviewees shared their observations and opinion of the various effects of climate change. The interviewees were presented with a list of climate related events and they were asked to simply answer with a “Yes”, “No” or “Not sure”. The residents of both communities cited flooding as the most important and prevalent effect of climate change. There were two other common effects that were mentioned as noticed by a total of five candidates in both areas. One of them is the changes in forest species composition. The other one is the changes in forest productivity.

In Nackawic/Southampton, a noticeable effect of climate change is the change in the abundance, diversity, and distribution of large mammals (deer, moose, bears, etc.) and birds. As well, in Doaktown/Blissfield two interviewees said that they have noticed the changes in the amount of growing stock.

The respondents were asked if they have a good understanding of the potential impacts of climate change on the forestry sector in New Brunswick. I asked three respondents from Nackawic/Southampton and two from Doaktown/Blissfield who are now

retired forest professionals or involved in forest industries. All the interviewees said that they have a good understanding of this issue. [Table 5]

Table 5: Understanding of the potential impacts of climate change on the forestry sector in New Brunswick (Yes/No)			
Nackawic/Southampton	Number of candidates	Doaktown/Blissfield	Number of candidates
Yes	3	Yes	2
No	0	No	0

From all these interviews it can be said that people in both communities have noticed different types of unusual events in the environment even though they are not certain about the main cause behind all these changes around them. People who are involved in farming or other forestry sectors are noticing the long-term effects of climate changes in these areas. Nonetheless, a large group of people are not aware of the bad effects of climate changes in both communities. Local people are cutting trees for their livelihood, but they do not understand the long-term consequences of their actions.

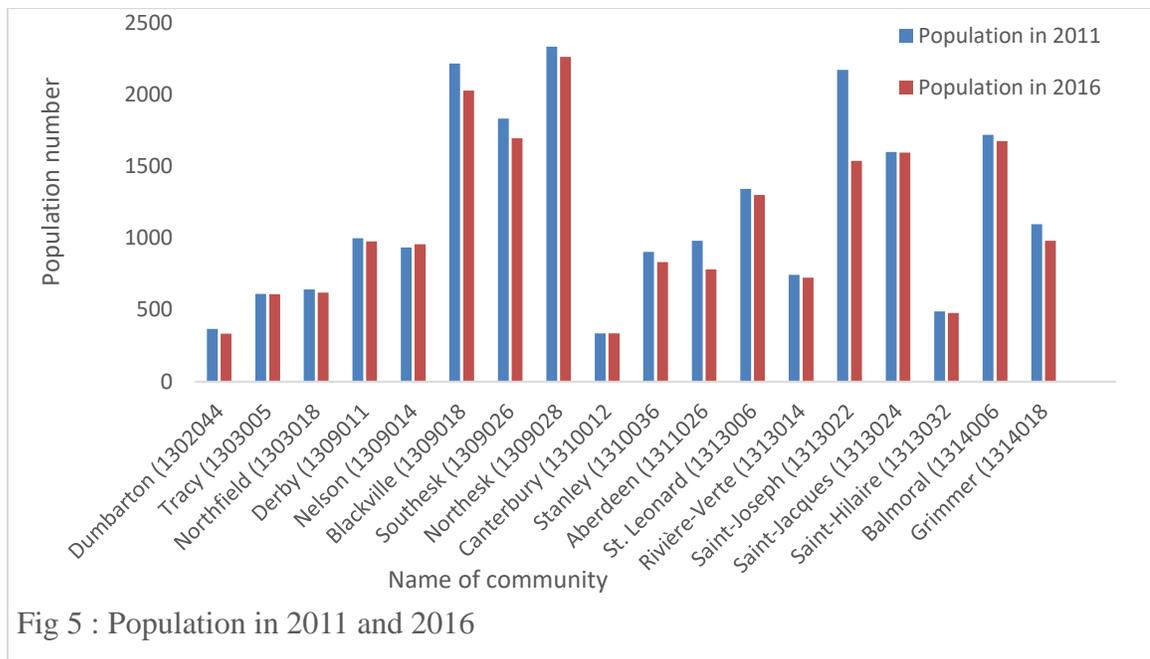
Examination of Statistics Canada Data for 18 jurisdictions in New Brunswick that were deemed forest-dependent in 2001

In 2001, there were 30 forest-dependent census subdivisions in New Brunswick but by 2016, this number had reduced to 12. We conducted a quick scan of the Statistic Canada data of these 18 communities. By analyzing the Census variables such as population, mobility, employment, etc. we found the link to the community capacity, vulnerability, and resilience of these communities. In this case, two adjacent census subdivisions will be considered one community. From the two adjacent census subdivisions of Nelson-Miramichi, we have considered the community of Nelson (1309014) for the research study. Besides for Balmoral-Eel River Crossing subdivisions we have considered the community of Balmoral (1314006) accordingly.

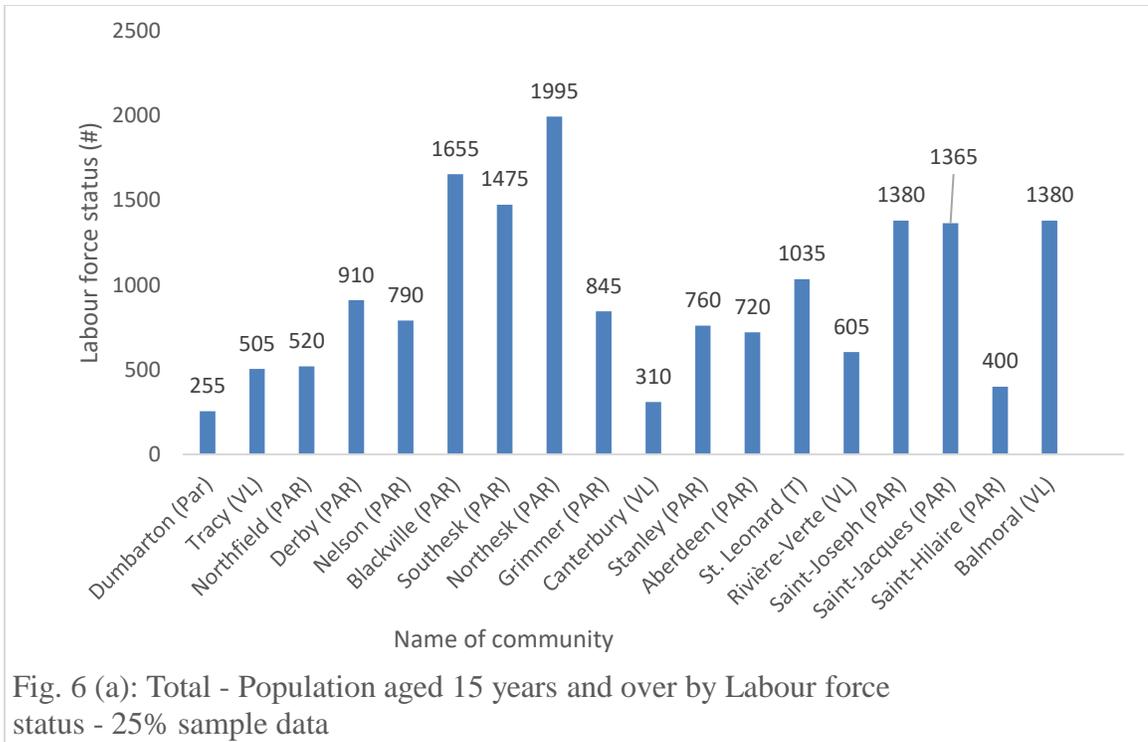
The considered communities for this study are as follows:

CSD (Census subdivision) Location	CSD type
Dumbarton (1302044)	PAR
Tracy (1303005)	VL
Northfield (1303018)	PAR
Derby (1309011)	PAR
Nelson (1309014)	PAR
Blackville (1309018)	PAR
Southesk (1309026)	PAR
Northesk (1309028)	PAR
Canterbury (1310012)	VL
Stanley (1310036)	PAR
Aberdeen (1311026)	PAR
St. Leonard (1313006)	T
Rivière-Verte (1313014)	VL
Saint-Joseph (1313022)	PAR
Saint-Jacques (1313024)	PAR
Saint-Hilaire (1313032)	PAR
Balmoral (1314006)	VL
Grimmer (1314018)	PAR

[In this table, PAR stands for the parish, VL stands for village and T stands for the town.]
 The population of most of the communities remained stable during the years 2011 to 2016 except for Blackville (1309018), Southesk (1309026), Northesk (1309028), Stanley (1310036), Aberdeen (1311026), Saint-Joseph (1313022) and Grimmer (1314018). In Blackville (1309018), Southesk (1309026), Northesk (1309028), Stanley (1310036), Aberdeen (1311026) and Grimmer (1314018) the number of populations reduced a little in 2016. But in Saint-Joseph (1313022) the number increased instead. [Fig. 5]



The collected data shows the labor force status of the total - population aged 15 years and over (25% sample data). [Fig. 6(a)] It shows that the greater number of people from Blackville (1309018), Southesk (1309026), Northesk (1309028), St. Leonard (1313006), Saint-Joseph (1313022), Saint-Jacques (1313024) and Balmoral (1314006) contributed to the production of goods and services locally.



However, Fig 6 (b) explicitly shows the percentage of employed and unemployed population of 18 different communities. According to the graph, the % employment rate is much higher in most of the communities than the % of unemployment rates because they have various opportunities locally to earn money rather than just depending on the forest sector.

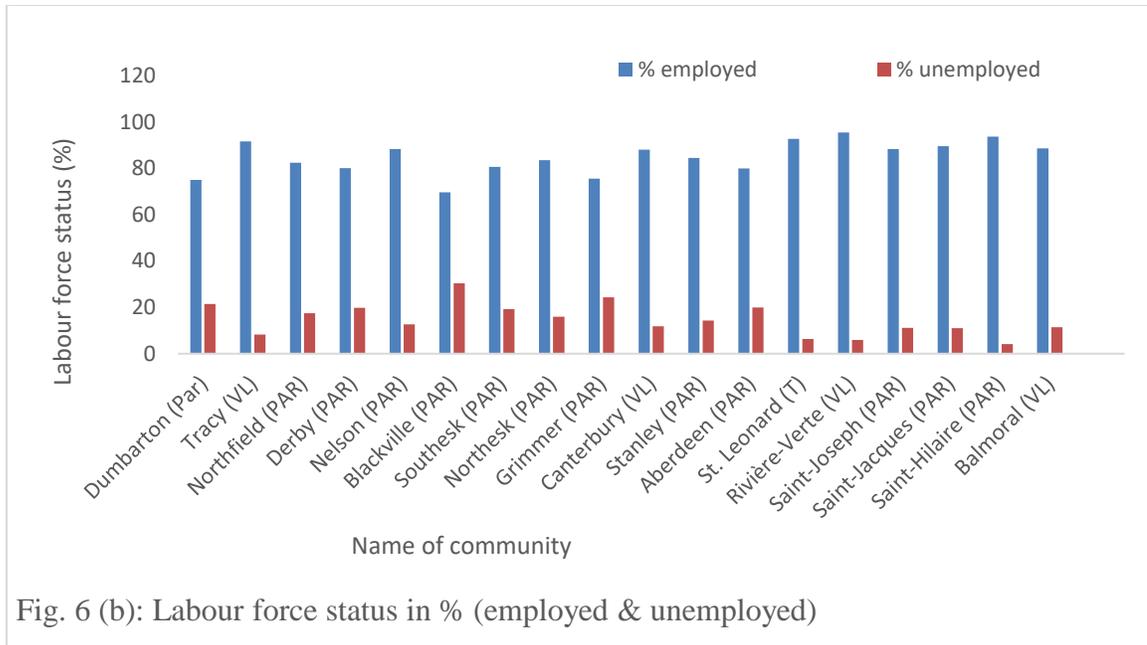


Fig. 6 (b): Labour force status in % (employed & unemployed)

According to Fig. 7, the data show the job attainment of individuals in the sector of natural resources, agriculture, and related production occupations. The lowest percentage of the population from Tracy(1303005), Derby (1309011), Nelson (1309014), Southesk (1309026), Northesk (1309028), St. Leonard (1313006), Rivière-Verte (1313014), Saint-Joseph (1313022) and Balmoral (1314006) are working in the natural resources, agriculture, and related production occupations whereas zero % of individuals are involved in this sector from Dumbarton (1302044).

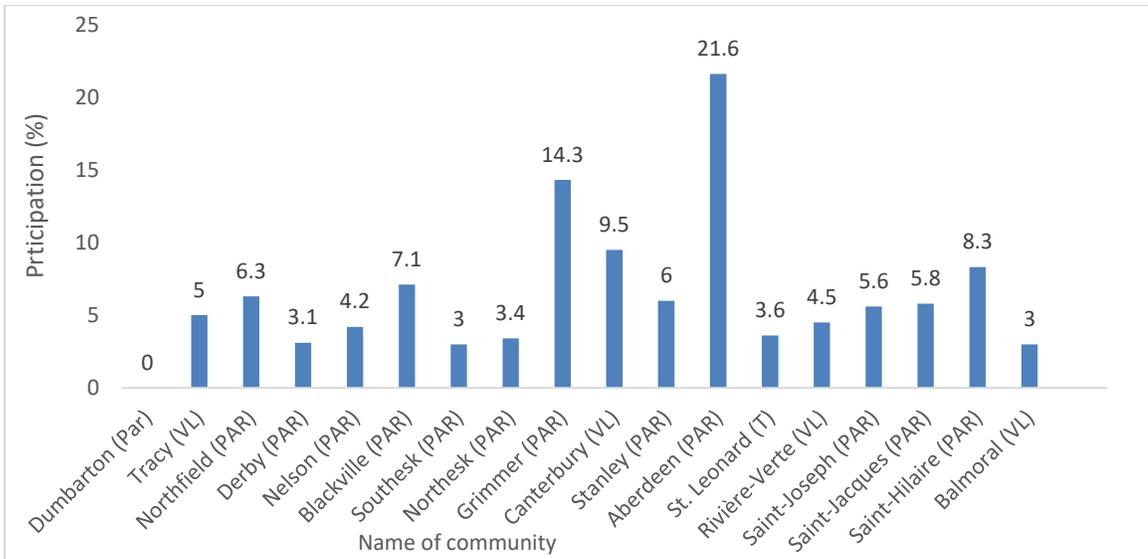


Fig. 7: Natural resources, agriculture and related production occupations (NOC) 2016 - 25% sample data

According to Fig. 8, all 18 communities are in stable condition as there is no drastic change in mobility. Because a very small number of people moved in or went out from their communities in the most recent five years. The same situation was repeated 1 year ago. [Fig. 8]

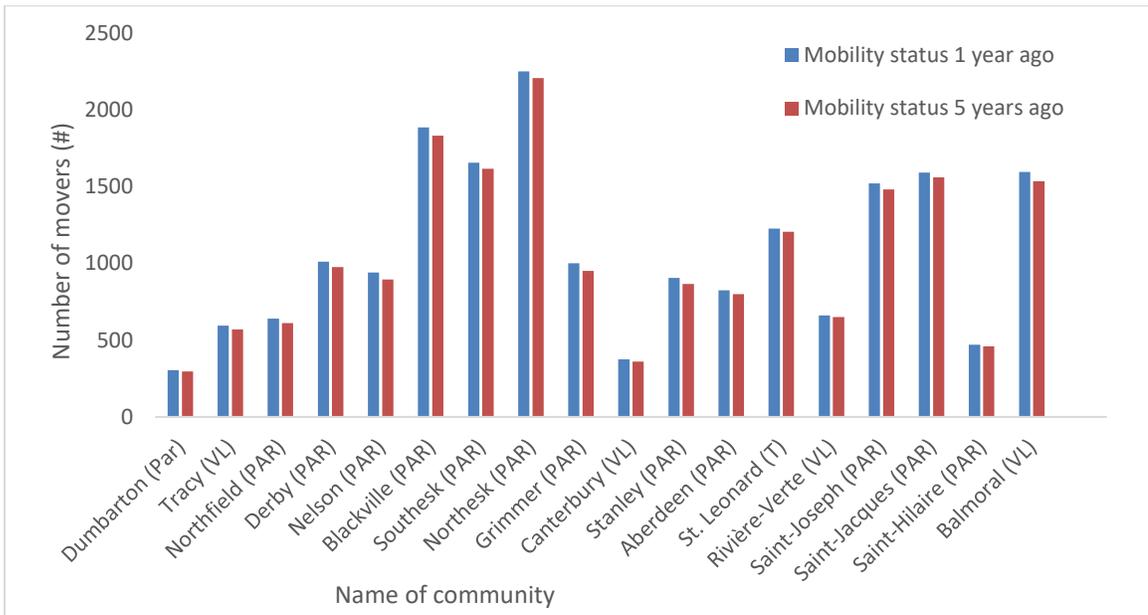


Fig. 8 : Total mobility status (25% sample data)

The results discussed above demonstrates the data collected from the interviews and the website of Statistics Canada (2016), to assess the community capacity of two forest-dependent communities. A general overview of the present condition of 18 non forest-dependent communities in NB has also revealed from this result section.

Discussion

The common theme from all the data collected for this project shows strong similarities between the interviews conducted and the data obtained online from Statistics Canada.

First, according to Statistics Canada, Doaktown/Blissfield has a higher percentage of elders (70-90 years old) than Nackawic/Southampton. Interviewees confirmed that Nackawic/Southampton has a higher working-class population than Doaktown/Blissfield. During the interview, most of the town personnel in Doaktown/Blissfield mentioned the issue of the aging of the community. Some respondents mentioned that young people are leaving Doaktown/Blissfield in pursuit of better jobs, because they can make more money elsewhere as opportunities are dwindling in this community. Some interviewees in Nackawic/Southampton mentioned that retired people from different parts of Canada choose to move in Nackawic/Southampton as people can easily buy a good property at a cheap price and people are very fond of the friendly environment in Nackawic/Southampton. This helps to explain the cause of the increasing population of recently retired people in this community. The Statistics Canada data confirms this increase of recently retired population number.

Second, for forest-dependent communities, it is vital to consider residents' mobility status. In accordance with data collected from Statistics Canada on Nackawic/Southampton & Doaktown/Blissfield, both communities are unstable in terms of mobility as the percentage rates of the movers in both communities are higher compare to the overall percentage of movers in NB. Most of the interviewees from both communities mentioned

that people are leaving these communities for better opportunities to other communities which explains the higher rate of mobility in both of these communities. The interviewees also mentioned that people are moving to Fredericton, Saint John or, other provinces for better job opportunities and they also want to taste the modern lifestyle in big cities.

In both communities, there is a significant number of people working in other sectors than the forest sector. The data collected during the interviews within both communities demonstrated that people whose primary source of income is forest-related are also looking to earn money from other sectors. This is because they cannot rely on the forest sector alone.

On average income is higher per capita in Nackawic/Southampton than in Doaktown/Blissfield. Despite having more employment opportunities in Doaktown/Blissfield it seems residents in Nackawic/Southampton are wealthier. The economic growth and prosperity in Nackawic are behind all these successes. Similarly, Nackawic is only 41 minutes to Fredericton on good roads, where Doaktown is 64 minutes from Fredericton on roads that are not as safe or reliable in winter. As the Nackawic area is closer to Fredericton therefore many local people from Nackawic find their jobs in Fredericton. Nevertheless, two of the interviewees mentioned their past involvement with the local JD Irving mill as a supplier and that many people and businesses within the community are dependent on this mill for their income.

In comparing these two communities, one thing that stood out was the fact that there are few facilities for old people in Doaktown/Blissfield whereas in Nackawic/Southampton there are elder care homes, nursing homes, and various local clubs, which keep older citizens active. That is why some interviewees said that old people are

left out in the community of Doaktown/Blissfield. The interviewees mentioned that poverty is an issue in Nackawic/Southampton. That is why a few interviewees mentioned that the poor people and newcomers are sometimes left out in their community as they need to be taken care of properly.

The interview data shows a good understanding by respondents about climate change and its consequences in both communities (Nackawic/Southampton & Doaktown/Blissfield), although some of the interviewees mentioned that not all the residents in their community understand or care about these issues. In some cases, local people just talk about various issues such as the reduction of river water level in hot summer, the decline in salmon population, etc. but they are not aware enough that those changes are happening because of various environmental damages caused by human beings. Some of the interviewees in Nackawic/Southampton said that people are doing clear-cutting of the forest and the softwood is increasing in this area which may pose a threat to the environment. One of the interviewees from Doaktown mentioned that the forests are getting cut near the water bodies too. That is why there are few trees to hold the water. Also, this situation is responsible to change the water table in the river and the water level is going down which will create water scarcity soon.

The respondents also mentioned the storm damage in the forest, flooding with brown water (mud), extreme heat, and reduction of water in the river. The respondents that are involved in the forest industry have noticed the presence of Spruce budworm generally. These species could have dramatic negative effects on local timber production soon.

The interviewees in Doaktown/Blissfield mentioned various weather-related changes that they recently observed such as the ice storm, much colder winters, extreme

wind, longer periods of warm weather, less water in the river, river siltation, etc. They also mentioned that clear-cutting and reduction of hardwood may contribute to some of the weather-related changes. All that information proves a good understanding of the environment and climate change of the local people who are working in the forest sectors in both communities.

In both forest-dependent communities (Nackawic/Southampton & Doaktown/Blissfield) clear-cutting of the forest is a big issue. Besides people are depending on the forest industry for their livelihood. Therefore, it is important to properly educate the population so that they can focus on other sectors than depending on the forest industry which will help to avoid future climate change consequences.

The Statistics Canada data illustrate that all 18 communities in New Brunswick that are no longer forest-dependent are in a stable condition considering their population growth, mobility rate, and employment opportunities. These communities are no longer depending on the forest sectors for employment opportunities and the % employment rates are still higher than unemployment rates. This is a good indication of self-sufficiency rather than just depending on forests. They have been successfully working in different sectors for their economic growth. Considering the present situation in these 18 communities it could be suggested that Nackawic and Doaktown can learn to adapt in terms of what worked and what did not work. For instance, the interviewees in Nackawic suggested that residents suffered a lot when the pulp mill was shut down. Also, many people are working in the JD Irving sawmill for their livelihood in Doaktown and they could be in a similar situation like Nackawic if the mill closes. Therefore, both communities that are relying on forests for their livelihood should figure out ways to diversify their economies because it

will eventually help them to restore their forests. This could be a long-term process, but it can be done if the local people become more conscious about their resiliency to climate change.

Conclusion and moving forward

In conclusion, after examining the results, Nackawic/Southampton appears to be the more resilient community of the two studied. They have higher incomes and a higher percentage of the population in the labour force, compared to Doaktown/Blissfield. Furthermore, they have a good facility (such as nursing home, elder care home) for old people. Also, they have many clubs and local organizations that help people to actively work for the betterment of the community. Because of the good location, people can easily drive to Fredericton for any emergency purpose. It is also easy to buy a property and live in a friendly neighborhood in Nackawic/Southampton. In Nackawic/Southampton, citizens, along with town personnel, are working together for the betterment of the community. They have a great plan for improving the local waterfront park to increase the attraction and attachment of the people in the community. Even as they make these development plans, they are concerned about the effects of climate change.

On the other hand, Doaktown/Blissfield has a higher senior population and fewer working-age people in the labour force. This community does not have enough modern opportunities to earn money except for the one sawmill owned by JD Irving. Because of the location, people cannot easily travel to Fredericton to get a job and poor-quality internet limits the possibilities for working remotely from the region, despite its desirable natural amenities. In this community, people do not care as much about climate change and its effects. Local interviewees said that people do not rely on the government for community developments as well. All these issues indicate that this community is becoming more vulnerable to economic downturns and are not well situated to take advantage of opportunities that climate change may bring (e.g. clean tech jobs, etc.).

One of the common issues that both communities have is that many young people are moving outside the communities for better education and employment opportunities.

Also, they have an increasing number of older populations. To grow a strong economy both communities need to take care of these issues. Nackawic already has a better plan to create more opportunities and local attractions to keep its young generation in the community. The interviewees from Nackawic confirmed that they have different local committees to increase the awareness among the local people and students about various climate-related changes in this area. Besides in Doaktown, it is very important to increase local awareness. In this case, Doaktown councillors and local organizations need to act sooner.

Finally, due to the COVID-19 pandemic situation, it was very hard to contact people to take more interviewees for this research report. Also due to the COVID-19 situation, no one from the 18 communities was reachable and due to the traveling restrictions, it was not feasible to physically go there to collect data and frequent attempts to reach town and village officials by phone and mail did not yield results. But further research on some other social indicators can add more valuable information. Besides local surveys and interviews need to be conducted to compare the data with the present conditions of these communities. It is also important to conduct a survey to understand their economic growth and to understand how well the people are surviving without depending on forestry in these communities. These inquiries can help the 12 other forest-dependent communities in NB to move forward successfully without depending on forest industries.

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Appendix 1

Survey Documents

There are 2 surveys associated with this project. These are:

- 1) **Survey 1: Citizen/resident/key informant survey** (6-8 each in Nackawic/Southampton & Doaktown/Blissfield)
- 2) **Survey 1A Foresters Supplement:** A supplemental survey for foresters in each of those two case study communities (2 additional interviews in each locale – they will also be asked the same questions in the citizen survey)
- 3) **Survey 2, Municipal official survey:** A short list of questions for municipal officials and/or town clerks in formerly forest-dependent communities. following contains Interview Questions for Public/Residents of New Brunswick

Survey 1: Citizen/Key Informant Survey

Thank you for taking time to participate in our study.

The project title is: Costs and benefits of adapting to climate induced changes in drought and wind regimes in New Brunswick's (Doaktown/Blissfield and Nackawic/Southampton) forests.

With your consent this survey will be recorded. At any point you may choose to answer a question off the record, in which the recorder will be turned off.

I would like to state that this is not a test, we are simply looking for your opinions and input on each question. If at any point there is a question that you are not sure of or do not want to answer, you may state that, and I will move on.

At this point I will begin the survey and if you have any questions or need clarification please feel free to stop and ask.

Part 1: Community Characteristics

****This section will talk about the community where you live. ****

- 1) How long have you lived in this community? [If not a lifelong resident, why did you choose to live here?]
- 2) If you work, do you work here in the community? If no, where (how far away)? (could be retired, student, unemployed, on disability – cannot assume they are working).
- 3) What sorts of local organizations do you belong to?
- 4) What type of activities do you participate in locally?

- 5) How do things get done in this community?
 - a) Give an example of how people accomplished something great while they worked together.
 - b) Give an example of how people came together and accomplished something in response to a threat or a challenge: [If they talk about COVID as the challenge, try to get them to also give a pre-COVID example]
 - I. Individuals – Who was involved?
 - II. Did any institutions help the community? If yes, then what was their contribution? (money, people, expertise, infrastructure).
 - III. Resources –
 - a. Individuals – who was involved?
 - b. Institutions – what, if any, institutions did the community draw on? What do they bring? (money, people, expertise, infrastructure)
 - c. Resources –
 - i. What resources were available and mobilized locally in events A and B above
 - ii. What resources were relied on from outside your community in events A and B above?
- 6) How do you/your community react to the way the world is changing around you?
- 7) Do you feel there is much awareness in the community about climate changes and its potential local impacts here?
- 8) How would you describe the community’s overall level of concern about climate change?
- 9) In your opinion, what is the best thing about your community? (prompts, if they say the people, ask what about them, if they say “location,” ask what attributes. They can say more than one thing, but if they give a laundry list, try to get them to prioritize).
- 10) In your opinion, what is the worst thing about your community? Who/how does “mutual aid” happen here? (similar prompts): Disconnect among neighbors.

- 11) If someone wants to invest capital for a return on investment, are they encouraged/permitted to do that in this community? Do you have an idea that many people do this here?
- 12) when it comes to solving problems/creating opportunities, whom do you rely on in this community?
- friends/family (kin)
 - volunteers
 - businesspeople
 - government, institutions at any level
- 13) Who do people trust in this community?
- Individuals
 - institutions (your church, community recreation)
 - government
- 14) Who is left out? Are there people on the margins who have difficulty integrating in the community or difficulty accessing services? (prompts = poor, elderly, disengaged newcomers?)
- 15) What aspects of your community do you hope to stay the same? Are any of these under threat? If so, from what?
- 16) [This likely will have already come up, but if not, ask explicitly] What has your community learned about its adaptability, resilience or vulnerability through the recent COVID-19 crisis?
- 17) Over your time in the community, have you witnessed any major environmental changes? If so, what were they, and what consequences or effects did they bring?
- 18) If we arrange a workshop in this community about this research and what we are learning, who should attend?

Survey 1A: Forest professional's supplement

*This section will only be asked of two respondents in each case community that are involved in the forest sector.

Script to be read to respondent: *This is not a knowledge test; we are simply looking for participants' opinions. If there are any questions where you are unsure or don't know the answer to, saying "I am unsure/don't know" is completely fine. **

- 19) How long have you worked in the forestry or a forestry-dependent sectors?

- 20) Over the course of your career, have you noticed any changes relating to weather-related damage to trees? (e.g., prolonged drought, ice damage, storm damage, etc.). If yes, what were they?
- 21) Do you have a good understanding of the potential impacts of climate change on the forestry sector in New Brunswick?
- 22) Have received training (workshops, information documents, etc.) pertaining to climate change through your employer? If yes, can you describe the nature of the training?
- 23) Did you ever have to adjust your working schedule because of any weather-related changes?
- 24) Over the course of your career, have you noticed an increase in undesirable/exotic/pest tree species? If yes, what were they?
- 25) Is there any discussion in your professional community about adapting to climate change through assisted migration of tree species?
- 26) In your opinion, do you think climate change will affect timber production over the longer term in New Brunswick? If yes, in what ways?
- 27) How do you think that the enterprise you work for should best respond to climate change?
- 28) Are there other forest-related products that are important to consider as we think about adapting to climate change? (i.e., maple syrup production, harvest of berries and mushrooms, or other forestry products)
- 29) How confident are you in the value and quality of the research done by the federal and provincial governments, and universities on climate change and climate change adaptation?
- 30) How confident are you in the ability of the forestry industry and New Brunswick's department of Energy and Resource Development to predict and adapt to climate change?

Part 3: Opinions about the effects of climate changes

*This section will be similar to the last one but focuses on participants' opinions and observations about the effects of climate changes on regular livelihoods, weather and forests. You can simply answer the questions by saying "Yes", "No" or "Not sure". Again, this is not a knowledge test, I am simply looking for participants' opinions. If there are any questions where you are unsure or don't know the answer to, saying "I am unsure/don't know" is completely fine.
*

31) Over the course of your career, did you notice the following incidents:

Yes No Not sure

An increase in flooding that affected work sites or other aspects of day-to-day work?

Earlier budding on hardwoods and needle de-hardening

A shift towards earlier spring tree growth

An increase in forest pests

Changes in forest species composition

That weather conditions have reduced harvest season length

Changes in the abundance, diversity and distribution of large mammals (deers, moose, bears, etc.) and birds

Changes in regeneration success

Changes in forest productivity

Changes in the amount of growing stock

32) Do you feel that people with forestry expertise, Government Regulators, and scientists have similar understandings of actual and potential impacts of climate change on the forest?

33) Do you have additional comments/feedback you would like to share?

*Ask: Would you like to have access to the final reports for this project?

- if yes, ask for email

Survey 2: Municipal officials of formerly forest-dependent communities

Script to be read: *According to Statistic Canada data, your community was classified as a forest-dependent community in 2001, but current data suggest that your community is no longer forest-dependent. We are conducting a small investigation regarding this change in status and circumstance.*

1) In your view, does this change in status from forest-dependent to no longer forest-dependent make sense to you? Explain?

- 2) How would you characterize your community today? Thriving, struggling?
- 3) Has there been significant changes to the local economy or to the social make-up of the community over the past two decades?
- 4) Do you think your community is better off today than it was in 2001 and why or why not?
- 5) Regardless of the economic circumstances in your community, would you say people that live there are generally happy and content or unhappy or discontent?

Appendix 2

Interview Schedule (Doaktown)

Name	Location of Interview	Date/Time	Duration¹
Carl Price	Town Hall office	24 August 2020 11:30 AM	51 minutes
Paul Gillespie	Town hall office	26 August 2020 11:30 AM	41 minutes
Austin Gillespie	Atlantic salmon museum	26th August 2020 11.45 am	52 minutes
Valerie O'Donnell	Atlantic salmon museum	26th August 3.30 pm	30 minutes
Benjamin Beek	Doaktown Historical museum	26th August 2.30 pm	32 minutes
Karen F. Swim	Atlantic salmon museum	26th August 10.30 am	36 minutes
Morris Green	Via phone call	28th August 02.00 pm	1hr 24 minutes

¹ Some interviews went above the expected duration due to added information given by the interviewees.

Interview Schedule (Nackawic)

Name	Location of Interview	Date of Interview	Duration²
Barbara Brown	Via phone call	11 August 2020 4.00 pm	41 minutes
Robert B. Simpson	Town council	18 August 2020 10:00 AM	1hr 43 minutes
Mr. Kenneth Moore	At his house	18 August 2020 12.45pm	43 minutes
Mr. Steve Eldridge	Waterfront park	18 August 2020 2.00 pm	52 minutes
Neil Ferguson	Waterfront park	18 August 2020 3.00pm	1hr 2 minutes
Dr. M. Bramstrup	At her house	18 August 2020 4.30 pm	20 minutes

² Some interviews went above the expected duration due to added information given by the interviewees.

Appendix 3

All the recording of the interviews from Doaktown/Blissfield and Nackawic/Southampton are available in form of soft copy. Those recordings will be provided upon request.