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When Further Inclusion of Indigenous Youth Matters:
Towards Smart Climate Change, Resilient Indigenous Territories, Communities, and Diasporas

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Abstract

This research shows a path to an inclusive entry into the 21st century of a smart changing world on matters related to Indigenous peoples' rights and climate change resilience building. The participation of Indigenous youth in the creation of Indigenous smart climate-resilient territories, landscapes, ecosystems, and communities is presented as a key asset under the Indigenous peoples Rights Global Agenda and the Sustainable Development Global Agenda (SDGA). Political goodwill is needed to enable Indigenous peoples bring up to authorities, to decision-makers, and other stakeholders, strategic information on their land and community. This information can be observations, life conditions, uncommon situations, threat, damage, or any other event which may occur in their territories, within their communities and on individuals among the people. Being first-hand eyewitnesses of climate change impacts on their lands and in their communities, Indigenous peoples ought to be fully included in decision-making processes on the future of their territories and communities. The methodology adopted to conduct this policy research project consists of two mutually supportive frameworks. The first is a normative framework of relevant human rights is related to Sustainable Development Global Agenda provisions with a focus on the United Nations Declaration on the Rights of Indigenous peoples (UNDRIP). The second is a New Information and Communication Technologies (NICs) plural interface developed under the implementation of the United Nations Biodiversity Global Agenda (UNCBD). This technology framework includes the internet, landscape Geomatics technology with geo-referenced and GIS technology environments, and remote sensing. It also includes mobile phone applications and is enhanced with institutional arrangements consisting of clearing-house mechanisms (CHM) to facilitate and democratize participation of Indigenous youth in the implementation of the normative framework, locally (territory) and within a country with examples in Canada, but also within a region and even globally. This contribution shows that the technology framework will enable the participation of Indigenous youths of several territories and communities within a region and even globally through its online, CHM, and smartphone application components. Keep in mind, however, that political goodwill and the adoption of suitable institutions to protect the privacy of Indigenous peoples and their youth throughout this participation are key prerequisites to any success of including these vulnerable populations in the current smart world.

1.0 Introduction and Research Guidelines

Indigenous matters have been addressed by multilateralism over the last decades and are addressed in this contribution under the broader scope of environmental–human rights relating to the Sustainable Development Global Agenda with a focus on the United Nations Declaration on the Rights of Indigenous peoples (UNDRIP). This treaty was adopted by the United Nations General Assembly (UNGA) Resolution 61/295 at the 107th plenary meeting of September 13, 2007 (UN General Assembly 107th Plenary Meeting, 2007). The text of the UNDRIP was, however, adopted a year before under the Human Rights Council recommendation in its 1/2 Resolution of June 29, 2006 (UNGA, 2006). Nevertheless, even though the UNDRIP adoption was an important first step in recognition of the rights of Indigenous peoples, its implementing process has not been an easy task due to the complexity of Indigenous matters at the local, national, and global levels. For example, Canada only adopted the UNDRIP on May 10, 2016, with a full commitment to implement it under the Canadian Constitution, and with a renewed nation-to-nation relationship with Indigenous peoples (Indigenous and Northern Affairs Canada, 2016). The relationship between Canada and Indigenous peoples is based on recognition of rights, respect, co-operation, and partnership with a full commitment to engage with Indigenous groups on how to implement the principles of the UNDRIP—including with provinces and territories whose co-operation and support is essential to this work—and to advance the vital work of reconciliation with Indigenous peoples in the country (Indigenous and Northern Affairs Canada, 2016). In taking the step of empowering Indigenous peoples in asserting their rights under the Canadian Constitution, the country has set up new perspectives on Indigenous rights. Examples in Canada will be used to illustrate comments and thoughts throughout this article. The adoption of the UNDRIP by the United Nations General Assembly is among the main achievements of multilateralism. The implementation process of the United Nations Environmental Programme (UNEP) Convention on Biological Diversity (UNEP/CBD, 1998) has also led to the adoption of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization. (UNEP/CBD, 2012). This treaty contains normative provisions on local and Indigenous communities. In parallel, technology is being presented as a key asset to enable the implementation of such normative provisions. For instance, UNCBD experts agreed that understanding changes in biological diversity due to climate change should include the active participation of local and Indigenous communities, insisting that technology ought to be brought into contribution (UNCBD, 2006).

This research was conducted using a mutual supportiveness approach of these normative and technology provisions. In more practical words, the technology framework was used to facilitate the implementation of the normative framework. Such an approach led us, in this research project, to highlight the benefits of enabling Indigenous youth participation in the creation of smart climate-resilient Indigenous territories, communities, and diasporas in the current changing world. This participation strives, for Indigenous peoples, to bring back to authorities, decision-

makers, and other stakeholders: (a) information, (b) observations, (c) treats, (d) accidents, (e) damages, and (f) any harmful event occurring in their territories, communities, and on individuals which affect their normal conditions of life. This vision is meant to lead to further the inclusion of Indigenous peoples in decision-making processes, as first-hand eyewitnesses of the climate-change threat impacts on their lands and in their communities. Examples in Canada will be used to illustrate arguments where appropriate throughout this contribution.

We present the two framework components: normative and technology. The methodology and results, in terms of promises of the technology framework to assist in the implementation of the normative framework, will follow. Prerequisites for the success of such mutual supportiveness will be presented as a discussion of results before a general conclusion, which will be followed by a global call to the inclusion of Indigenous youth in a climate-resilient smart planet under construction.

2.0. Why Indigenous Youth Participation in the UNDRIP Implementation Matters?

The future of Indigenous peoples is their youth, and the aspirations of Indigenous young people are the heart of the UNDRIP. Therefore, consistent strategies and programs to implement UNDRIP ought to involve youth participation, and any implementation initiative involving Indigenous youth should carry an important potential for success. We plan to use technology innovation to facilitate Indigenous youth to better assert their human rights, and more specifically, environmental-related human rights. UNDRIP text covers a variety of human rights-related provisions where youth participation can make a difference in the implementation process. However, this research focused on provisions elated to practical mechanisms of participation such as: programs, strategies, and projects on training, education, and awareness. We also address other relevant provisions of international environmental law relating to: (a) training, (b) education and child protection, (c) criminal justice, (d) environmental justice, (e) awareness and capacity building, and (f) security.

2.1. Training Through Capacity Building

States are providers of training assistance in the context of the UNDRIP. They ought to establish and implement assistance programs for Indigenous peoples without discrimination. Indigenous peoples indeed have the right to "access financial and technical assistance from states and through international co-operation, for the enjoyment of the rights (UNDRIP, article 29, paragraph 21, 2007; UNDRIP, article 41, paragraph 27, 2007). Article 12 of the Global Pact for the Environment on education and training states that "Parties shall ensure that environmental education, to the greatest possible extent, is taught to members of the younger generation…" (Le Club des Juristes, 2017, p. 5). This research will show that innovation can help develop technology frameworks, solutions, and interfaces with the potential to assist in training programs enabling Indigenous people's youth actively to participate in the UNDRIP implementation.

2.2. Awareness Through Capacity Building

The Nagoya Protocol (article 21) exhorts Parties to take measures to promote "voluntary codes of conduct, guidelines and best practices and/or standards in

consultation with indigenous and local communities and relevant stakeholders." (UNEPCBD, 2012, pp. 15-16). Indigenous Peoples must indeed be aware of: (a) legal, (b) institutional, (c) administrative, (d) funding, (e) governance, (f) security, (g) safety and, (h) technological means made available to them given the full enjoyment of their rights. In this research project, states and the international community are compelled to mobilize and make use of capacities building means and resources to develop and implement awareness programs enabling Indigenous youth full participation in the UNDRIP implementation.

2.3. Education and Child Protection

In the preamble of UNDRIP, countries recognize in particular the right of Indigenous families and communities to retain shared responsibility for the upbringing, training, education, and well-being of their children: consistent with the rights of the child. In this regard, article 17, paragraph 2, mentions that "States shall in consultation and co-operation with Indigenous peoples take specific measures to protect Indigenous children from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development, taking into account their special vulnerability and the importance of education for their empowerment" (article 17, paragraph 2, p. 15).

2.4. Indigenous Youth Security and Safety

Crimes have been perpetrated against Indigenous peoples outside reserves, mostly in large city schools. In fact, between 2000 and 2011, seven Indigenous teenagers died in Thunder Bay, Ontario, as they were attending secondary school (Tagala, T. June 23, 2017). Some leave reserves seeking better well-being in large Canadian cities, such as 14-year old Indigenous teen Josiah Begg of Kitchenuhmaykoosib Inninuwug First Nation, who was found dead on May 6, 2016, in Thunder Bay ("Body of teen Josiah Begg found in Thunder Bay," 2017). North Caribou Lake First Nation's Tammy Keeah, 17, died on May 7, 2017 (Alex, 2017). Also, the body of Stacy DeBungee, a 41-year-old Rainy River First Nation man, was found in a river in October 2015 (Mayor, 2016). These deaths, among other threats such as exclusion, mental disorders, and exposure to hardships of all kinds, highlight difficulties that Canada is facing in the implementation of UNDRIP article 7 which states that Indigenous individuals "have the right to life, physical and mental integrity, liberty and security of person" (UNDRIP, article 7, paragraph 1, 2007, p. 9. Paragraph 2 of the same article states that "the collective right to live in freedom, peace, and security as distinct peoples and shall not be subjected to any act of genocide or any other act of violence" (UNDRIP, article 7, paragraph 2, 2007, p. 9). Security and safety are among the main threats of Indigenous people's life, especially Indigenous young people outside of reserves in large cities.

2.5. Criminal Justice

UNDRIP article 7 on criminal justice is one of the core provisions of the treaty. Criminal justice on Indigenous matters is a compelling issue nowadays in Canada. According to Scrim's (2017) Aboriginal Victimization in Canada: A Summary of the Literature concerning violent crime, Aboriginal People were three times more likely to have been victimized. After these numerous deaths, Northern Ontario

Indigenous leaders called on provincial and federal authorities to investigate these tragic deaths (Talaga, May 31, 2017). States laws, Indigenous legal traditions as well as international criminal law should be brought into a contribution to implement UNDRIP article 7 on criminal justice.

2.6. Access to Environmental Justice

Access to environmental justice under legal mechanisms such as liability and redress is a challenging normative activity in international environmental law and international human rights law. In the context of Indigenous communities, challenges are even more important since most of the time Indigenous lands and territories host industrial activities such as: (a) mining; (b) hydro-electricity; (c) fishing; (d) maritime transports; (e) hunting and forestry and; (f) natural and genetic resources including food, nutrition, pharmaceuticals, cosmetics, and so forth. Multinational corporations have their own rules based mainly on productivity and profit and less on sustainability or human rights. Article 11 of the *Global Pact for the Environment,* deals with the subject of access to environmental justice. It states that "Parties shall ensure the right of effective and affordable access to administrative and judicial procedures, including redress and remedies, to challenge acts or omissions of public authorities or private persons which contravene environmental law, taking into consideration the provisions of the Pact" (Le Club des Juristes, 2017, p. 4. Article 28 of the UNDRIP emphasizes that "Indigenous peoples have the right to redress, by means that can include restitution or, when this is not possible, just, fair and equitable compensation, for the lands, territories, and resources which they have traditionally owned or otherwise occupied or used, and which have been confiscated, taken, occupied, used or damaged without their free, prior and informed consent" (UNDRIP, article 28, 2007, p. 20).

It matters that Indigenous youth get hold of these key human rights in a participative way needed to enable them efficiently participate in the implementation of the UNDRIP.

2.7. Towards Indigenous People's Rights on Access to Environmental Related Technology for Participation in Landscape Resilience Building

Indigenous peoples ought to play a key role in building resilience on their lands, territories, and communities for their future and the future of generations after them. Their participation in the UNDRIP implementation is needed. For instance, they can contribute to the collection and the processing of information and data on their lands, territories and, communities. Indigenous People's young people can help correlate such information and data to help in decision-making to ensure sustainability. They are key witnesses of the effect of climate change on Indigenous lands and communities. Their participation in climate change adaptation and mitigation matters, because they are the builders of the future of Indigenous lands, territories, and communities. Even more, Indigenous people's lives and perennial settling in their lands depend on what is done by the current generation to mitigate and to adapt under the current climate change threat. The future of climate-change resilient Indigenous lands in terms of biodiversity and of climate-change resilient communities in terms of poverty eradication ought to do with the participation of the Indigenous youth. Technology innovation is much needed to this end.

We endeavored in this section to show that Indigenous young people's participation in the implementation of the UNDRIP matters. We now aim to show in the coming section how landscape and ecosystem Geomatics including geo-referenced technology and NICs may facilitate enhancing Indigenous people's youth participation.

3.0 Research Technology Framework: When Online and Smart Technology Boosts Inclusion of Indigenous Peoples in the Construction of the Current Smart World

The adoption of the United Nations Declaration on the Rights of Indigenous Peoples is not only an important step in Indigenous people's assertion of their rights. It is also a multilateral move towards their inclusion in the construction of a climate-resilient planet in which Landscape Geomatics including Geo-referenced Technology and New Information and Communication Technologies (NICs) are pillar assets.

3.1 Landscape Geomatics and NICs General Outlines under the UN Biodiversity Global Agenda

There are many environmental technology solutions developed under the global sustainable development agenda on ecosystem sustainable development and management. We will, however, focus on general guidelines adopted under the United Nations Convention on Biological Diversity (UNCBD), mainly in the UNCBD Technical Series No. 25. At point 19 of their recommendations, expert authors of the Technical Series agreed on the fact that understanding changes in biological diversity due to climate change should include the active participation of local and Indigenous communities (UNCBD, 2006). Scientists were convinced that sustainable development in the light of adaptation to climate change needs to document, analyze, and apply traditional knowledge in ways that complement science-based knowledge and vice versa (UNCBD, 2006). To implement such provisions, experts shared the desire to see new information technology facilitating communication between local and Indigenous communities, such as web-based multilingual tools (UNCBD, 2006). In this research project, we are committed to taking a step further by bringing into contribution a GIS technology interface with geo-referenced and remote sensing components as well as a NICs technology interface. These technology interfaces are meant to magnify the quality of the information and data intended to be shared between Indigenous People communities. These additional technology interfaces will also help to better manage the expected online communication and information sharing between local and Indigenous communities. This last input will be also enhanced by a Clearing-House Mechanism (CHM) institutional component. Together these technology interfaces and the CHM institutional arrangement will help efficiently implement point 19 of UNCBD Technical Series No. 25 through the participation and inclusion of Indigenous peoples, especially the youth.

3.2. Perspectives on Indigenous People's Youth Participation in UNDRIP Implementation through the Web-based (Internet) Technology Environment

The practice of public participation, in general, aims to empower citizens through processes where they know their participation has a potential positive impact through inclusion and effectiveness of visible outcomes at the municipal, national, regional, sub-regional and global scales (King, Feltey, & O'Neill, 1998). Kingston et al. highlighted the advantages of web-based approaches in public participation (Kingston et al. 2000). A few of these need to be mentioned among many other advantages. Public participation practices through the internet can be conducted from everywhere (Kingston et al, 2000). The public can participate at any time 24/7 (Kingston et al. 2000). The practice can be conducted anonymously if desired by the participant to ovoid confrontational situations (Kingston et al. 2000). Online public participation allows information sharing, exchanging and, disseminating among landscape managers and citizens (Manga, 2016). Information and data shared can be observations, events, opinions, ideas, suggestions, expertise, and constructive critics (Manga, 2016). These can be shared live as they occur for more efficiency (Manga, 2016). These functions of the web-based technology environment are efficient didactic tools of education, dissemination and, awareness of Indigenous rights, especially among Indigenous young people. However, the quality and accuracy of information and data to be shared on the landscape can be enhanced by other suitable landscape technology interfaces that can take Indigenous peoples' participation further to a position of involvement in decision-making.

3.3. Enhancing Information Quality with GIS and Geo-referenced Technology Towards Indigenous Youth Efficient Participation in the UNDRIP Implementation

Geomatic Information Systems (GIS) applications are counted among the key landscape technologies of the future (Manga, 2016, pp.5-8). The potential of GIS in promoting the goals of nongovernmental organizations, grassroots groups, and community-based organizations has appeared to be an efficient asset in policy-making (Sieber, 2006, p. 1). GIS's main traditional functions are the collection, crossing, analyzing, and processing of data and information on earth and social areas of the population and the community such as the economy, governance, legislation, policy, culture, and security (Manga, 2016, pp. 5–8). Techniques used to collect and process information can be remote sensing, earth & geosciences, mathematical modeling, algorithms development, programming, computerizing, bio, environmental and green chemistry, public consultation, surveys, etc. After processing collected information, GIS has other specific functions of visualizing, communicating, and vulgarizing final results in variable forms such as sustainability indicators, maps, diagrams, statistic listings, graphics, images, photographs, satellite imagery, videos, etc. GIS outputs are used to help in decision-making. GIS is a tool of decision-making and a pedagogic framework. In this, GIS technology environment and geo-referenced related technology environments such as General Positioning Satellites (GPS) are excellent tools able to enhance the quality and accuracy of the information and data on Indigenous people's lands and territories to be shared between Indigenous people's young people as they participate in the implementation of UNDRIP provisions on education, rights dissemination, awareness, and environmental and poverty eradication matters.

3.4. GIS Technology Environment Approval Under UN Biodiversity Global Agenda

The UN Biodiversity Global Agenda implementation process contains capacity building related provisions that allow the contribution of other stakeholders such as the industry and other civil society entities such as universities and NGOs. These stakeholders are conducting an appreciable contribution to the implementation of Point 19 of UN CBD Technical Series No. 25. The UN CBD Satoyama Initiative is one of those channels of contribution. This Initiative, named after the Japanese landscape Satoyama, is known to be a host of harmonious, sustainable life between man and nature. The Satoyama Initiative Management occasionally held Global Conferences of the International Partnership for Satoyama Initiative (IPSI) to ponder on ways, strategies and, technology tools to implement the Initiative. The First Conference was held from March 10 to March 11, 2011, at the United Nations University Institute of Graduate Studies' Headquarters (Nature Conservation Bureau, 2009). At this event, which was jointly hosted by the Institute and the Government of Japan, UN CBD Secretariat' officials and members of Satoyama Initiative Management presented technology prospective findings in favor of the use of GIS technology to support and enhance the implementation of web-based multilingual tools recommended at the Point 19 of UNCBD Technical Series No. 25. Satoyama Initiative experts agreed on the efficiency, suitability, and potential of GIS technology and opened the door to further prospect towards Landscape Geomatics Technology innovation on matters related to information communication between Indigenous people's communities for sustainability sake.

3.5. The Limits of Current GIS Landscape/Territory Geomatics and Online Technology Environments

Landscape Geomatics is a promising Land Management Technology field. This technology environment helps efficiently address geospatial matters related to the sustainable management of landscapes such as cities, territories, and ecosystems at the local scale (Manga, 2016). It is at the same time this scale limitation, which shows GIS technology weakness in the context of enabling the international community optimally and efficiently addresses challenges related to land and community resilience building and sustainable development goals reaching the regional and global scales. In fact, despite their potential to facilitate Indigenous young people asserting their rights through participation, online and GIS technology environments fail to meet the United Nations Agenda of exchange and information shared in the context of transboundary threats such as poverty eradication, biodiversity loss, land degradation and climate-change resilience building at the regional and global scales. As we all know, these threats are not confined within national boundaries. They are often addressed within regional strategies and projects. GIS more common applications are conducted at the municipality city level. Likewise, online consultation is mostly used for decision-making at the community or national levels. Fortunately, innovation is taking a move to some promising perspectives. The potential of online and GIS technology environments is being magnified by institutional arrangements such as the CHM and by NICs technology interfaces. NICs are brought into contribution through smartphone applications. Both the CHM institutional arrangement and smartphone applications are dedicated to information sharing at the regional and even at the global scales with the sole purpose of ultimately helping democratize public participation.

3.6. *Magnifying Worldwide Indigenous Youth Participation to the UNDRIP Implementation with the Clearing-House Mechanism (BCH) Component*

The Clearing-House Mechanism (BCH) was launched at CBD article 18 which says that "The Conference of the Parties, at its first meeting, shall determine how to establish a clearing-house mechanism to promote and facilitate technical and scientific cooperation" (UNEP/CBD, article 18, paragraph 3, 1998, p.12). CHM is an administrative arrangement promoted under the implementing process of the CBD and its protocols. CBD article 18 states that "Contracting Parties shall, in accordance with national legislation and policies, encourage and develop methods of cooperation for the development and use of technologies, including indigenous and traditional technologies, in pursuance of the objectives of this Convention." (UNEP/CBD, article 18, paragraph 4, 1998, p.12).

In the CBD Nagoya Protocol, article 21 states that "Parties are exhorted to take measures to promote voluntary codes of conduct and guidelines and best practices in consultation with Indigenous and local communities and relevant stakeholders to raise awareness." (Nagoya Protocol on ABS, 2011, pp.15–16). In this provision, establishment and maintenance of help desks for Indigenous and local communities and relevant stakeholders and information dissemination through national CHM are suggested. CHM arrangements allow landscape managers, governments and institutions (local, national, regional and global) along with the public (citizen, tourists, scientists, civil society, NGOs) to exchange information on landscapes (Manga, 2016). The global implementation of the UNDRIP will benefit from allowing, for example, Indigenous young people of all countries to share personal or group experiences of contribution to climate adaptation and mitigation, poverty eradication and, crime combatting in their reserves and communities.

3.7. *Democratizing Indigenous People's Global Participation to the UNDRIP Implementation with Smartphone E-applications*

Landscape Geomatics Technology trends in the implementation of Point 19 of UN CBD Technical Series No. 25 are in favor of the use of smartphone applications, along with the internet, GIS Technology and CHM institutional arrangements, to facilitate the democratization of global and worldwide participation of Indigenous young people of all continents. The same trends are noted in the democratization of the public, in general, on matters related to landscape climate change resilience building in terms of sustainability and community/population resilience building in terms of poverty eradication. Smartphone applications are meant indeed to democratize participation and experiences exchange and sharing between all landscape and community stakeholders. Indigenous people of all countries and continents can, therefore, share and exchange their achievements from education programs related to Indigenous people's rights in their countries to encourage one another to build climate resilience and eradicate poverty in their territories and communities. The implementation of UNDRIP related provisions can be greatly boosted with smartphone applications.

4.0 Methodology and Results: Promises of Smart Landscape Geomatics Technology Innovation Trends in the Implementation of Indigenous Peoples Rights Global Agenda

In this section, we seek to highlight promises of Smart Landscape Geomatics Technology trends—presented above—to facilitate the implementation of UNDRIP' provisions through Indigenous people's youth participation. Especially, we will endeavor to highlight the potential of these innovative technology interfaces to facilitate implementing UNDRIP provisions in human rights and socio-economic related rights. We will also address the Declaration's provisions in territory management and landscape and community climate-change resilience-building, including poverty eradication. We aim to conclude this section by showing that Smart Landscape Geomatics Technology trends' promises can be implemented through training programs, projects, workshops, sessions, and any other activity which can be organized and implemented with online Landscape Geomatics Technology tools and smartphone applications. The training purpose is to exhort Indigenous peoples to take advantage of the opportunity they have under the UNDRIP implementation process to assert their rights in education, awareness, public health, culture, believes, criminal justice, security, safety, governance, as well as in territory and natural resources management related areas. However, a few of these potential areas and fields to materialize Indigenous people's youth participation will be used as illustrations in the present study. Also, as stated in introductory chapters, the Government of Canada's vision of empowering Indigenous Nations in asserting their rights throughout the Declaration implementing process will be used to illustrate the promises of current Landscape Geomatics Technology trends. However, we will also use provisions of other relevant treaties especially within the United Nations System specialized agencies and other intergovernmental organizations having established ways and means of ensuring participation of Indigenous peoples on issues affecting them as stipulated in article 41 of the Declaration.

4.1 Conducting Indigenous People's Youth' Participation in Human Rights Assertion through Smart Landscape Geomatics Technology Innovation Trends

Indigenous people's youth participation in UNDRIP implementation perspectives on Human Rights related normative provisions will be addressed with a focus on self-determination. Indigenous young people's right to self-determination, including membership or citizenship, is probably the foundation of all their human rights-related rights. Article 3 of the Declaration states that "Indigenous peoples have the right to self-determination" and that by this right, they freely determine their political status and freely pursue their economic, social, and cultural development. Article 4 adds that "Indigenous peoples, in exercising their right to self-determination, have the right to autonomy or self-government in matters relating to their internal and local affairs, as well as ways and means for financing their autonomous functions." Article 31 states that "Indigenous peoples have the right to preserve their oral traditions, literature, designs, sports, and traditional games and visual and performing arts as well as their right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions."

Smart Landscape Geomatics Technology innovation trends can help implement such normative provisions. For instance, the GIS technology environment helps to collect

statistics and produce databases in each human right field. CHM and smartphone applications can be used to disseminate such information for awareness, exchange, and co-operation among Indigenous people's communities within a country and when suitable within a region, a continent, and globally.

4.2. Conducting Indigenous People's Youth' Participation in Socio-Economic Rights Assertion through Smart Landscape Geomatics Technology Innovation Trends

Socio-economic information and related data are the sources of any community's vision. Most policies, administrative arrangements, legislations, and those so-called governmental priorities of the day-to-day life are conceived and adopted based on socio-economic statistics, information, and data. Smart Landscape Geomatics Technology innovation trends are well indicated to enhance Indigenous people's youth participation in the implementation of UNDRIP socio-economic related rights. The GIS technology environment is a strategic technology tool to gather information to help identify Indigenous people's territories and communities' current and future needs. It is, therefore, a suitable tool for decision-making. Smart Landscape Geomatics Technology innovation trends can help organize and harmonize Indigenous people's youth involvement in socio-economic activities under the UNDRIP implementation process. They can, this way, contribute to creating prosperity in their lands, communities. In particular Smart Landscape Geomatics Technology innovation trends can facilitate the adoption of decisions enabling a watch young Indigenous people's socio-economic condition. In particular, if these are not suffering from "economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development, taking into account their special vulnerability" (articles 17 and 32). Besides, Smart Landscape Geomatics Technology innovation trends can boost the implementing process of these provisions in facilitating consultation and co-operation through the Online and CHM environments. Moreover, data and information collected in socio-economic sectors can be securely stored in GIS databases to ensure continuity in Indigenous people's rights in general. Secured storage is one of the key traditional functions of GIS technology.

Indigenous people's socio-economic rights related to public health are among the most important. Indigenous peoples in Canada, especially the youth, have their own specific public health issues such as alcoholism, depression, etc. Public health issues in reserves can also be due to industrial activities in Indigenous lands. Nations agree in the UNDRIP that states "shall take effective measures to ensure that no storage or disposal of hazardous materials takes place in the lands or territories of Indigenous peoples without their free, prior and informed consent" (article 29, paragraph 2, p.21). Moreover, in such a scenario of exposer to hazardous materials, states shall take effective measures to ensure, as needed, that programs for "monitoring, maintaining and restoring the health of Indigenous peoples, as developed and implemented by the peoples affected by such materials, are duly implemented" (article 29, paragraph 3, p. 21). The international community will find efficient ways to implement such normative provisions with Smart Landscape Geomatics Technology innovation trends. The GIS technology environment can be used to collect, processed and, store data and information related to public health to help in decision-making to build up healthy, resilient Indigenous communities. At the regional scale, the online, the BCH, and the smart environments can help to share

and exchanging public health-related information and data since Indigenous communities are isolated and scattered in neighboring countries and continents. Indigenous young peoples can play a key role in public health co-operation strategies.

In the present research, socio-economic rights also include social considerations and traditional knowledge, culture, and spirituality. Article 25 of the UNDRIP states that "Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard (UNDRIP, article 25, p. 19)

They have the right to preserve such socio-cultural acquisitions. As a reminder, Nations agree in article 31 of the Declaration that "Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge, and traditional cultural expressions." Moreover, article 34 states that "Indigenous peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices." This provision of the Declaration goes further on Indigenous legal tradition, adding that in the cases where they exist, juridical systems or customs following international human rights standards should also be promoted, developed, and maintained by Indigenous peoples. Nations conclude in agreement that states are compelled to take effective measures to recognize and protect the exercise of these rights in conjunction with Indigenous peoples. Among many other advantages, the assessment of Indigenous peoples' youth's participation in the implementation of such provisions in terms of the degree of self-determination, for instance, can be facilitated by Smart Landscape Geomatics Technology innovation trends. Indeed, the GIS technology environment can help to build databases. Online and smartphone applications technology environments along with CHM institutional arrangements, can help share any outcome and findings among stakeholders, including governments, corporations, NGOs, and Indigenous peoples themselves, especially the youth. Dissemination and vulgarization through thematic maps and geo-referenced tools can also help knowing where religious spots are to be protected, preserved, and respected. Other cultural related maps can be also produced and put online as results of GIS processing. With such a potential, Smart Landscape Geomatics Technology innovation trends can allow Indigenous young people to take part in decision-making on matters related to traditional knowledge including culture and spirituality within a country, throughout a region, a continent, and globally.

4.3. Conducting Indigenous People's Youth Participation in Territory Management through Smart Landscape Geomatics Technology Trends

Indigenous peoples have indeed a special relationship with their territories. They are connected to their lands, which is the source of economic activities but also the ground of their culture, believes, and traditions. The territory in Indigenous People's society is indissociable with life. This reality does not always go well, along with the interests of corporations conducting economic and industrial activities on Indigenous lands. However, multilateralism has been able to adopt the UNDRIP, which is a global acceptance of such a reality. In the preamble of the UNDRIP, Nations are convinced that control by Indigenous peoples over developments affecting them and their lands, territories, and resources will enable them to maintain

and strengthen their institutions, cultures, and traditions, and to promote their development by their aspirations and needs (UNDRIP, Preamble, p.4).

Parties, through the UN Biodiversity Agenda (UNCBD, 1998), have also adopted the *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization* (UNCBD Nagoya Protocol on ABS, 2012). This treaty contains normative provisions on local and Indigenous communities magnifying the special connections between Indigenous peoples and their territories, lands, and life. The UN Agenda on matters related to Indigenous peoples' territory management is being implemented, and technology is playing a strategic role in the current smart world. Smart Landscape Geomatics Technology Innovation trends can help further include Indigenous peoples in the building of the current smart world. The GIS technology and geo-referenced technology can help collect and gather data and strategic information on Indigenous peoples' land in sectors such as agriculture, fishery, ice melting, hunting, extractive industry, natural parks, natural reserves, biodiversity reserves, rivers, inland waters, transboundary waters, river valleys, lakes, etc. These technology interfaces can lead to Indigenous peoples' participation in decision-making in the management of their territories and communities. Online and smartphone application technology environments along with CHM institutional arrangements can facilitate information exchange and share among Indigenous people's territories and communities in a country and within a region and even globally.

4.4. Conducting Indigenous People's Youth' Participation in Climate-Change Resilience Building through Smart Landscape Geomatics Technology Innovation Trends

In the preamble of the UNDRIP, states recognize that "respect for Indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment." Indigenous young people, if empowered, can indeed participate in the implementation of the UNDRIP' provisions related to territory and land sustainable management as well as to climate-change resilience building. Smart Landscape Geomatics Technology Innovation trends offer an ideal technology framework to address sustainable land management and climate change resilience building in Indigenous peoples' territories and lands. Perspectives on Geomatics technology show that the GIS technology environment will be a key technology interface in the collection and processing of information and data on landscape. As part of innovation trends on landscape climate-change, resilience-building technology GIS technology environment, including remote sensing and geo-referenced technology will be given a strategic place in the collect, processing, crossing, and visualization, and geo-reference of information and data of Indigenous peoples' landscapes in different sectors such as agriculture, fishery, ice melting, hunting, extractive industry, natural parks, natural reserves, biodiversity reserves, rivers, inland waters, transboundary waters, river valleys, and lakes. Such information can be shared and exchanged among Indigenous peoples' territories and communities within a country, a region, a continent, and globally by other Smart Landscape Geomatics Technology Innovation trends such as online and smartphone applications technology environments and CHM institutional arrangements.

4.5. *Conducting Indigenous People's Youth' Participation through Training Programs with Smart Landscape Geomatics Technology Innovation Trends*

All programs mentioned in this chapter as potential avenues for Indigenous peoples' youth participation can be implemented by training programs, projects, workshops, or sessions as it suits. Multilateralism has adopted over the last decade's many normative provisions related to education, including training, awareness, and capacity building. These are mainly adopted on behalf of vulnerable groups or communities such as developing countries and Indigenous peoples. They are mostly presented in terms of financial and funding arrangements or technical assistance. For instance, in article 17 of the Declaration, Nations recognize "the right of Indigenous families and communities to retain shared responsibility for the upbringing, training, education, and well-being of their children, consistent with the rights of the child." Article 36 of the treaty adds that in consulting and seeking full co-operation with Indigenous peoples to implement the Declaration, states shall take effective measures to facilitate the exercise. Article 37 adds that facilitation measures should include building awareness among Indigenous peoples as to how they can fully enjoy their rights. Programs, projects, workshops and training sessions in education, awareness, and capacity building can be developed to implement such provisions with current Smart Landscape Geomatics Technology innovation trends. For example, online and GIS technology environments are efficient tools to facilitate awareness and education. They are suitable environments to process, illustrate, and visualize information on Indigenous peoples' human rights and to disseminate such among their youths within a country, within a region, and even globally. The overall goal of this training is to have Indigenous young people be aware of all available resources allowing them to fully enjoy their rights under the Declaration and other legal instruments. Awareness has a cost related to capacity building, assistance, technology transfer, and funding. Article 12 of the Le Club des Juristes' (2017), *Global Pact for the Environment,* is dealing with education and training. Parties are exhorted to "ensure that environmental education, to the greatest possible extent, is taught to members of the younger generation as well as to adults." States ought to establish and implement assistance programs for Indigenous peoples for such conservation and protection without discrimination, as stated in article 29 of the Declaration. As agreed in this article, Indigenous young people have indeed the right to access to financial and technical assistance from states and through international co-operation, for the enjoyment of the rights. In the CBD Nagoya Protocol, article 21, parties are exhorted to take measures to promote voluntary codes of conduct and guidelines and best practices in consultation with Indigenous and local communities and relevant stakeholders to raise awareness. For instance, Canada can find in Smart Landscape Geomatics Technology innovation trends a technology framework to implement these provisions with a priority given to Indigenous young people and women. Smart Landscape Geomatics Technology innovation trends offer, in fact, a perennial educational platform for awareness and information sharing between Indigenous peoples. Once empowered, these vulnerable populations can fully assert their rights as a result of their inclusion in the implementation of the UNDRIP.

5.0 Discussion: Prerequisites to a Successful Participation of Indigenous Peoples Youth in UNDRIP Implementation with Smart Landscape Geomatics Technology Innovation Trends

UNDRIP normative provisions and Indigenous peoples' rights related provisions adopted in environmental treaties are together a suitable normative framework to conduct Indigenous people's youth participation in climate-change resilience building and poverty eradication within Indigenous peoples' territories and communities. Such participation has the advantage to include Indigenous peoples in the creation of sustainable conditions for the future of their life in their territories and communities in a changing world where the internet and smartphones are key tools of communication. This research has also presented trends of landscape Geomatics technology innovation, strategically supported by the internet and smartphone applications to facilitate Indigenous peoples' youth participation in the creation of smart Indigenous peoples' territories and communities the same way as smart cities are being created throughout the planet. However, because of the specificities of Indigenous peoples' populations, there are key prerequisites for any success of such a vision. In this paper however, we will focus on the need for full implementation of UNDRIP provisions related to administrative and institutional arrangements to enable Indigenous youth full contribution. The second prerequisite is political will among states.

5.1. Implementing UNDRIP Provisions on Governance to Enable Indigenous People's Participation

The implementation of UNDRIP provisions related to community governance and institutional arrangements are a prerequisite to Indigenous people's participation in the creation of sustainable conditions for their future. Nations in the preamble of the Declaration agreed on key provisions addressing these issues to guarantee rights to Indigenous peoples to enjoy the freedom of management of their communities and institutions. Such provisions are the expression of nations agreeing on the fact that Indigenous peoples have the right to organize themselves for political, economic, social, and cultural enhancement and to bring to an end all forms of discrimination and oppression wherever they occur. Article 5 of the Declaration emphasizes that "Indigenous peoples have the right to maintain and strengthen their distinct political, legal, economic, social and cultural institutions." (UNDRIP, 2007, p.9). They also retain their right to participate fully, if they so choose, in the political, economic, social and cultural life of the State while everyone individual of them has the right to a nationality (article 6, p.9).

Article 33 of the Declaration states that "Indigenous peoples have the right to determine their own identity or membership under their customs and traditions and this very right does not impair the right of Indigenous individuals to obtain citizenship of the states in which they live (UNDRIP, article 33, paragraph 1, p. 24,). Moreover, they have the right to determine the structures and to select the membership of their institutions following their procedures (UNDRIP, article 33, paragraph 2, p. 24). Article 34 recalls that "Indigenous peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices and, in the cases where they exist, juridical systems or customs, by international human rights standards (UNDRIP, article 34, p.24). They also have the right to determine the responsibilities of individuals to their communities, UNDRIP, article 35, p. 25).

5.2. Political Goodwill Among States to enable UNDRIP Implementation with Indigenous People's Participation Towards Smart Indigenous Peoples Territories and Communities

As a reminder, the participation of Indigenous peoples is meant for them to bring back to the authorities, decision-makers, and other stakeholders all information and any observation on the condition on the situation and any kind of event occurring in their territories, communities, and on individuals among the people. Information on their territories will be collected in different sectors such as agriculture, fishery, ice melting, hunting, extractive industry, natural parks, natural reserves, biodiversity reserves, rivers, inland waters, transboundary waters, river valleys, and lakes. Information on their communities will reflect their day-to-day socio-economic hardships and achievements but also specific needs of individuals. In all cases, such information needs to be protected and used only towards the assertion of their rights and the full implementation of UNDRIP normative provisions and other related provisions adopted in relevant environmental treaties. For this, there needs to be strong political goodwill from the states. Only strong political goodwill among states can lead to the adoption of institutional arrangements to frame the access, the use, and the control of information collected. In such a perspective, one can see Smart Landscape Geomatics Technology innovation trends training stations funded by states and UN organizations and agencies but owned by Indigenous peoples' youth groups or associations and hosted by university or college campuses and ideally by Indigenous communities' centers. Political goodwill prerequisites are needed to create success in the facilitation of Indigenous peoples' youth participation in building smart resilient territories for their future and the preservation of their culture and values. UN System potential partners can be UN Biodiversity, UNICEF, UNESCO, the United Nations Permanent Forum on Indigenous Issues, etc.

6.0 Conclusion

The implementation of Indigenous peoples' Global Agenda normative framework under UNDRIP and UN Biodiversity can be boosted by Smart Landscape Geomatics Technology innovation trends towards the development of smart Indigenous peoples' territories and communities, the same way as many smart cities are expected in the current smart century. However, such a vision cannot be performed without Indigenous peoples' participation. The process ought to be inclusive. It is expected that Indigenous peoples bring back to authorities, decision-makers, and other stakeholders, all information and any observation on the condition, and situation and any kind of event occurring in their territories, communities, and any harm or threat individuals are facing among the people. Indigenous peoples are first-hand eyewitnesses of climate-change damages on their lands and in their communities and are therefore key partners and stakeholders in matters related to climate-change resilience building in Indigenous peoples' lands and poverty eradication within Indigenous peoples' communities. To facilitate Indigenous peoples' participation, UN Biodiversity agenda experts and the Satoyama Initiative Roster of Experts Panel have initiated technology innovation work that leads to current Smart Landscape Geomatics Technology innovation trends used as the technology framework to conduct this research. This contribution also shows that there are prerequisites to any materialization of the inclusive vision to further associate Indigenous peoples in the creation of suitable living conditions for their generations to come in this changing smart world. To make such a vision happen, a

suitable territory and community governance and strong political goodwill among states and within the UN System will be much valued.

7.0 Towards a Global Moral Step of Effective Inclusion of Indigenous Peoples and Youth in the Current Smart World

This is the time when we know that the youth around the world are taking real leadership in environmental matters (Howard, 2019) after the Swedish teen environmentalist Greta Thunberg has launched the youth involvement in political processes for sustainability towards the future that future generations want. Enabling Indigenous youth in Canada and throughout the world to take part in the current involvement of youth on sustainable development worldwide, will be itself a step towards the future we want for coming generations in general, and in particular within Indigenous territories, lands, and communities. Multilateralism ought to take a global stand to include Indigenous peoples' youth in the construction of the current smart resilient planet and avoid marginalization, which is inconsistent with the principles of the future we want. Implementing UNDRIP with Smart Landscape Geomatics Technology innovation trends will generate an optimal simultaneous implementation of the Global Sustainable Development Agenda, including the UN Biodiversity (UNCBD), the United Nations Framework Convention on Climate Change (UNFCCC), and the United Nations Convention to Combat Desertification (UNCCD).

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