



D1.4. Analysis of the current training needs in resource management and sustainability in the diverse coastal context of Colombia and Costa Rica.

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Abstract	Analysis above the current environmental threats in the Caribbean coast of Colombia and Costa Rica, focusing on the problems related to the tourism pressure, as well as the risks associated to the resource management related to all the economic sectors. Each partners presents orientations towards the new masters' programs and the new masters' courses.
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EXECUTIVE SUMMARY

1. TRAINING, SKILLS AND PERFORMANCE - Universidad del Magdalena 8

The report presents propositions of formation of the future program and analyses the participants' profiles.

2. Analysis of the current training needs in resource management and sustainability in the diverse coastal context of Costa Rica – UCI and UNA 16

Both Universities tries to present the training needs relating to what's already in place in masters' programs in the Universities.

3. Analysis of the current training needs in resource management and sustainability in Colombia - *Universidad EAFIT*..... 22

In preparation of the development of 2 new courses (modules) for EAFIT's Master's in Earth Sciences within the context of the STOREM pathway, this report analyzes the current training needs in resource management and sustainability in Colombia. The report begins with an introduction of ecotourism in Colombia, followed by a summary of national issues and environmental threats in coastal Caribbean Colombia, based on a previous report of the STOREM project (D1.1.). This part of the report identifies a wide range of environmental threats, such as pollution, deforestation, flooding, coastal erosion and sea-level rise, which all place significant pressures on coastal tourism and indicate a clear need for improved watershed and coastal management. The following part of this report, based on the previous STOREM report D1.3, reviews the existing training paths available for Master's studies in Colombia on the subjects of watershed and coastal management. This analysis thus identifies significant gaps in training paths available in Colombia at the Master's level on the subjects of watershed and coastal management, thus justifying the development of two new courses defined as: 1) Watershed Management for Environmental Protection, and 2) Coastal Management for Sustainable Beach Tourism.



4. Orientations for a new master course – UWI 42

UWI proposes a revision of the existing sustainable tourism in the coastal zone course and the development of a new course in tourism and hazard mitigation planning.



1. TRAINING, SKILLS AND PERFORMANCE - Universidad del Magdalena

1.1. Propositions of formation of the program

The Universidad del Magdalena aims to "train integral professionals with solid theoretical, technical and instrumental knowledge about tourism and hotel organizations, with a strong orientation towards research, creativity and innovation; to be able to assume the leadership to develop projects, the promotion and strengthening of companies in the tourism chain, the improvement of the quality and competitiveness of the tourist destination with sustainability, the resolution of problems, face challenges and make strategic decisions for growth , development and strengthening of the tourism industry at the local, regional, national and international levels. "

The specific purposes of program formation are the following:

- To train graduates with theoretical-practical knowledge about tourism organizations, who are competent to face challenges and make strategic decisions.
- To train qualified graduates capable of using the scientific and instrumental knowledge of the discipline to solve problems and meet the challenges that arise from the sector for its development and consolidation.
- To train graduates with skills for research applied to tourism, in order to contribute to the improvement of the quality and competitiveness of the tourist destination in which the graduate is inserted.
- To train graduates with competences for the planning, administration and management of processes of different kinds, in organizations, undertakings or impact projects in companies, communities.
- To train graduates with tools for the promotion and strengthening of companies in the tourism chain through advice, technical assistance, support, management, promotion and training to entrepreneurs to increase competitiveness.
- To train graduates with competencies to coordinate and / or execute strategic projects in municipal, departmental or national areas to improve the tourism infrastructure, contributing to tourism development and competitiveness.



PROFILES

The formative intentionality, based on the development of the indicated competences, under the influence of the pedagogical approach that the University of Magdalena receives, which expresses the position of the Institution, compared to the offered program, is materialized in the following profiles: graduate, professional and occupational for the future magister.

Applicant Profile

The aspiring to the program of "Masters in sustainable tourism" must be creative, enthusiastic, with social sensitivity, passionate about tourism and service with quality; with a willingness to work in a team, an entrepreneurial attitude, adaptation to changes and the ability to innovate. Have a broad verbal capacity and service attitude. It must be professional, also entrepreneurs, students of other programs of the Universidad del Magdalena.

Professional profile

The Magister in sustainable tourism, from the Universidad del Magdalena, will be distinguished for being competent in the planning, management, organization, administration and management of the companies that make up the tourism and hotel sector from a "tactical-strategic" approach, developing tourism in the regions with criteria of sustainability, creativity and innovation, leadership, social responsibility and critical spirit; according to the needs demanded by the tourist and hotel environment of local, regional, national and international order. As you can see the profile of the professional tends to develop skills oriented to the strategic and prospective.



Occupational profile

As it has been indicated from the justification, the graduate of the "Masters in Sustainable Tourism" program of the University of Magdalena, as a strategist of the activity will be able to work as:

- Tourist consultant and / or consultant
- Director or secretary of local, regional, departmental or national tourism
- Designer, developer and evaluator of feasibility projects for the creation of sustainable projects.
- Entrepreneur • Tourist products designer
- Manager of companies that are dedicated to the promotion and development of tourism products in private and / or public companies.
- Researcher and developer of sustainable tourism plans, programs and projects in the public and private spheres.
- Director of social interaction processes based on tourism in local, regional and national communities.
- Evaluator of processes and results involved in tourism activity for decision making.

Performance fields

The graduate of the "Master's Program in Sustainable Tourism" can perform in various types of tourism businesses such as:

Tourism:

- Travel agency
- Offices of local, regional or national tourist planning, at private or public level
- Offices or quality departments in hotel and tourism enterprises
- Consulting Offices of private and public companies related to tourism. • tourism and hotel entrepreneur
- Local or regional tourism offices



Hospitality

- Hotels
- Clubs, restaurants, bars, cruises, cafes, banqueting houses, casinos, catering companies.
- Those that require preparation, design, innovation and services and products, where the various providers of tourism and hotel services are involved

Competencies

The Universidad del Magdalena understands competencies as "In the institutional mission, explicit reference is made to" forming citizens with social and environmental responsibility, capable of generating development ... ". In the institutional vision, references are made such as: In the year 2020, Universidad del Magdalena will be of the third generation (3GU), highlighted by its inclusion and innovation policies and its contribution to regional development "; "It will contribute to the consolidation of peace in Santa Marta, Magdalena and the Caribbean through a model of participatory, inclusive and innovative management that will guarantee an intelligent, friendly and sustainable campus, where the multiculturalism and biodiversity of the territory will be strengthened. " Sustain the curricula based on comprehensive training by competencies. This foundation is operationalized through the articulation of basic, specific professional, humanistic and investigative knowledge present in the curriculum of the program; that is to say, of general competences and specific competences, whose range goes from the broad to the particular.

Basic skills. They are the indispensable competences to live in society, to learn a profession or a specialized knowledge and to function effectively in any work environment; in them are the competences: socio-humanistic, citizens.



Professional Competences They are the particular basis of professional practice. These will be defined by each program according to the field of knowledge to which they belong.

From this point of view, professional competence implies the understanding and transfer of disciplinary knowledge to real-life situations; It requires relating, interpreting, inferring, interpolating, inventing, applying, transferring knowledge to solving problems, intervening in reality or acting in anticipation of action and its contingencies.

In this regard, the Magdalena University programs not only train people in terms of the theoretical and practical issues of the corresponding field of study, but also encourage training in autonomy and permanent self-learning. In this way, the fundamental emphasis is on the student assimilating the necessary modes of action to independently acquire the knowledge that they will later require in his professional work.

This training is achieved, through an integrated pedagogical model and articulated with the areas of training, which promotes the understanding of their objects, problems and methods that constitute them, so that, from within them, the student can ask questions and propose alternative solutions to phenomena and difficulties that arise in their context and work environment.

Consequently, the fundamental reason for the educational process is to offer logical, psychological, social, pedagogical and didactically organized spaces or opportunities where students are to learn and act on their own. Spaces where students can develop cognitive, affective, interpersonal and procedural skills and strategies that turn them into autonomous apprehenders. From this perspective it is sought, that the future graduate is a critical subject, who knows how to interact from his profession; which allows it to be linked with socio-cultural contexts and to consider the ethical - humanistic sense in decisions about the uses of knowledge



and the qualification of living conditions and the democratic participation of communities.

Arguelles (Malpica, 1996) argues that the fundamental thing is not the possession of certain knowledge, but the use that is made of it. The main axis of education by competences is performance understood as the concrete expression of the resources that the individual puts into play when carrying out an activity, and that puts the emphasis on the use or management that the subject must do of what they know, not isolated knowledge, in conditions where the performance is relevant.

In this way, the concept of competence gives a meaning of unity and implies that the elements of knowledge have meaning only as a function of the whole. Indeed, although their components can be fragmented, they do not constitute competence separately: being competent means mastering the totality of elements and not just of any of the parties.

According to this conception, the professional training in "Master in Management of Sustainable Tourism" is based on integrated professional competences, promoting an education that takes up the needs of Colombian society. However, such needs, as well as the contexts that the future graduates will face, are constantly changing, a situation that requires students to prepare not only to combine moments of practical work with moments of theoretical analysis, but also to be able to travel through them.

This foundation is operationalized through the articulation of global, professional, humanistic and investigative knowledge present in the program's curriculum. The combination of these elements makes it possible to identify the needs towards which vocational training will be oriented, from which the identification of professional, basic and transversal competences, essential for the establishment of the graduate profile of the professional Master in Sustainable Tourism Management, will also emerge.

The "Master in Sustainable Tourism Management" program is defined under the consolidation of competencies that allow the development of professional practice in accordance with the requirements of the occupational field of the Master in



Management of Sustainable Tourism, within the framework of normativity and contextualized reality.

Basic skills

Institutionally, the basic competences are made up of a series of transversal competences that strengthen the capacities of the professionals in the different programs. These competences are the same for all careers and must be incorporated by teachers according to their training proposal from the course plans to be developed. These are:

Sociohumanistic

- Strengthens the bio-psycho-social skills that ensure a successful interaction with the environment, as well as the permanent review and reconstruction of their life project.
- Acts in various social scenarios with responsibility and ethics, assuming leadership that characterizes him personally and professionally.
- Executes communication processes, according to the social context and means required, that allow you to interact assertively.
- Poses innovative and creative alternatives to situations or needs of their professional or social environment, which make it possible to improve the quality of life.
- Applies knowledge strategically and flexibly according to the object pursued, starting with the acquisition of learning strategies and meta-learning.

TIC

- It incorporates the use of ICT tools into exercises specific to their professional work, making their management more efficient.



Investigative

- Encourage description, interpretation, analysis, synthesis and argumentation skills.
- Encourage the generation of critical, creative and innovative thinking.
- Providing for real and specific solutions to problems of the environment, their profession and discipline, with ethical, ecological and social responsibility.
- Strengthen the student's autonomy in the acquisition and construction of knowledge, converting it into a manager of change and social development.

Professional competences of the program Education for tourism looks beyond the individual level and tries to offer a global perspective of what constitutes a specific perspective of a sector. The key concept is the provision of transfer of basic skills such as: analytical ability, the ability of written and verbal communication, and leadership, which should be developed and applied in different contexts. (OMT, in Ansarah, 2002: 20)

According to Tobón¹, the notion of competence has given rise to other logics of knowledge, to new logics related to access to it and has introduced new forms of training. These modalities involve the articulation of the institutional component and the regulatory component of training

Universidad del Magdalena understands professional competences as "related to sustainability, resilience, innovation and inclusion and effective work in diverse and heterogeneous teams where inter and transdisciplinary research schemes can be promoted, where the university campus and the strategic ecosystems of the region in living laboratories in sustainability that are epicenters of cooperation, innovation and development²"

¹ TOBÓN Sergio: Formación Basada en Competencias. Pensamiento complejo, diseño curricular y didáctica. ECOE ediciones Bogotá, 2006

² Política de Sostenibilidad Universidad del Magdalena. Versión 1



The University of Magdalena defines basic or generic competences as those transversal elements that contribute to the integral development of the individual indispensable to live in society and allow to approach the formation of the future graduated in its affective, social, cultural, citizen, ethical and aesthetic dimensions. Likewise, the development of generic socio-humanistic competences in a transversal way, will be oriented to ensure the integral formation of the professional and are conceived as cross-cutting elements that contribute in the development of the individual to do and apply the most basic learned in problem solving. Specific aspects of daily life include cognitive, technical and methodological competences for their daily tasks, which are of institutional commitment, which involves all the academic programs and units, which sculpt the distinctive seal, and finally the specific competences or disciplines, such as those that constitute the particular basis of the specific professional practice, that is, those associated with knowledge of a disciplinary nature, which are changing, depending on the dynamics of the different environments of the professional practice. The success of this competency-based training proposal lies largely in the correct selection of these competencies, which are valid in the market at the time of the student's graduation and at least some more time.

2. Analysis of the current training needs in resource management and sustainability in the diverse coastal context of Costa Rica – UCI

Thinking on the future, to strengthen capacities of students on topics that are just related with actual situation, has no sense, especially when we are seen cases like that climate change have reached record-breaking temperatures throughout the last two decades. Also, as some scientists affirming that critical tipping points of planet boundaries have been crossed and due of that, global warming is close to becoming irreversible.

Based on that situation is important to understand that Climate change both causes direct modifications in most of Earth's systems and also fosters other anthropogenic



processes ending with rapid deterioration of basic conditions for life, seriously compromising land, freshwater and oceanic ecosystems. On the other hand, natural and productive ecosystems are becoming less resilient and that affects direct our tourist offer.

From more simple problems as vanishing pollinators, plummeting fish stocks and plastic pollution to complex issues such as climate change and poverty, we have managed to push our planet into a different future, those topics will be attended if we want to keep an activity ongoing, like the tourism.

Sustainable Development, who has been works as base for our educational proposals, has shown that is not enough to stop the degradation process of the planet, that's why it is important to focus on updated the UCI master degree program, to includes a component on Regenerative Development.

Regenerative Development is based on six pillars (environment, social, economic, political, spiritual and politic) that goes beyond stopping environmental degradation to advance facing regeneration of all of those pillars but understanding regeneration as a process of continuously improvement for reduce our ecological footprint.

The regenerative development is a holistic approach that do not compartmentalized the six pillars but dynamized and intermingling on a co-evolutive and permanent process who includes:

1. Regeneration of functional landscapes in defined gradient of uses, maximizing biodiversity and ecosystem functions.
2. Social empowerment and development
3. New paradigms for economic development measured according to the wellbeing of humans and all life forms,



4. Conservation and valuation of living culture (including local knowledge, values and traditions)
5. Rethinking and redesigning current political structures
6. Fostering deep spiritual and value structures based on ethics, transparency and global well-being to allow humanity to live in peace with itself and planet Earth.

The gap that we would like to address in our master's program through the inclusion of a new module is a component that allows those involved in it to be able to intervene in a virtuous way the different dimensions of regenerative development, in order to guarantee that ecosystems remain in an adequate state of health, generating social, economic and environmental benefits and keeping the cultural values that were the responsible to woke the interest for tourism widely.

Is of our common understand, that this topic faces many challenges, but a good starting point is to un-learn many of the things that were taught to us. We need to develop a much stronger critical analysis of what is considered good for development. We also need to reevaluate how we do science and manage knowledge.

The contents of this module would focus on analyzing the triggers that promote environmental degradation, the dimensions of regenerative development, the identification of opportunities for the promotion of regenerative development and the implementation of measures for regenerative development.

Some of the contents that would be developed are linked to:

- Recovery of functional landscapes,
- Local empowerment
- Alternative economic models (Circular economy, economy of the common good, others)



- Ecosystem services valuation
- Politics and tourism
- Spirituality and tourism

Since regenerative development must be promoted from a holistic approach this module would be constructed and implemented transdisciplinarily.

Regenerative development is achieved using several instruments and methodologies, among which we can highlight the "natural solutions, the regeneration of functional landscapes, the application of the Ecosystem Approach as well as the Adaptation Ecosystem-Based adaptation, agroecology, climate-smart agriculture, permaculture and many others whose success has been proven in practice over the years.

3. General guidelines as to the curriculum of the master design - UNA

- The graduates of this master must have knowledge in the following subjects: conservation of natural resources, economic activation, protection of cultural heritage, architectural, archeological and landscaping, with the purpose of reorienting the strategy of development of tourism in the country.
- The master shall be designed for people interested in the strengthening of the following aspects associated with quality service with a clear orientation towards sustainability, minimizing the impact on the environment.
 - Quality service is valued from the following aspects:
 - Quality of the geographical environment
 - Quality of social environment



- Quality of the use of the free time (slow tourism)
 - Quality of tourist service
 - Promotion (generate enough information for the tourist)
 - Transport
 - Investment
 - Security
- The curriculum design of the master shall promote equity in distribution of resources.
- The curriculum design of the master shall promote compliance towards human rights, accessibility, ethics and compliance of a responsible tourism policy.
- The methodological theoretical approach of the master training should allow that professionals have the tools and knowledge to promote a disruptive tourism that includes elements such as:
- Conceptualization Latin American of the development model of tourism in the Central American and Caribbean regions.
 - Sizing up the territorial dynamics from the ecological, social, economic, ethno-cultural.
 - Approach from anthropology, sociology of tourism, geography, ecology, legal.
 - Management and public policy associated with tourism, entrepreneurship and linkages.

3.1. Theoretical content for the development of the master in UNA



1. Perspectives of the tourism development in Central America and the Caribbean
 - Central America and the Caribbean and the competitiveness
 - Sensitivity on the issues and the reality of the environment
 - Legal and political framework of Central America and Caribbean

2. Historical lessons of successful tourism development
 - Models of development of tourism in Central America and the Caribbean
 - Alternative development strategies
 - Development approaches
 - Accreditation systems

3. New challenges
 - Sustainability
 - Artificial intelligence and labour markets
 - Violence, corruption, insecurity, impunity

4. Expectations: human and sustainable territorial development
 - Territorial development
 - Human capacity development
 - Human development and ethical consumption

5. Goals
 - Sustainability
 - Competitiveness



- Equality

- 6. Learning of study

 - Search for territorial development axes:

 - Technological innovation
 - Economic management
 - Equity
 - Public policy
 - Biodiversity
 - Legal regulations
 - Natural heritage
 - Cultural heritage

Thesis; Research

4. Analysis of the current training needs in resource management and sustainability in Colombia - *Universidad EAFIT*

4.1. Introduction: Ecotourism in the Colombian Caribbean

Colombia has been described as a “megadiverse” country (2nd in the world after Brazil), known worldwide for its natural resources, rainforests, beaches and wildlife. These natural resources play an important role in the tourism of Colombia, which places a priority on the conservation of national natural parks. In the Caribbean region of Colombia, various national parks have been declared as conservation areas, which present visitors with ecotouristic destinations. These include forested mountainous areas such as the Sierra Nevada de Santa Marta National Park as well as the Colorados Flora and Fauna Sanctuary, some 100 km inland of the cities of Santa Marta and Cartagena, respectively. One of the most popular touristic



destinations in Colombia is the forested coastline of the Tayrona National Natural Park, at the base of the Sierra Nevada near Santa Marta. The coastal lagoon parks of the Flamingos Fauna and Flora Sanctuary, the Salamanca Island Park Way and the Ciénaga Grande of Santa Marta Sanctuary all represent important conservation areas of wetlands, which are essential to the Colombian Caribbean's biodiversity, although less popular for tourism. Of much greater popularity for tourism are the tropical marine parks of the Rosario and San Bernardo Islands (offshore of Cartagena) and the Old Providence McBean Lagoon (Caribbean island of Providencia), both of which are significant touristic attractions for scuba-diving, snorkeling and boating. Among these parks, the Ciénaga Grande de Santa Marta was declared as a Ramsar Site for wetland protection in 1998, and, with the Sierra Nevada de Santa Marta, are both although less popular for tourism UNESCO's list of Biosphere Reserves.

Coastal and marine ecosystems such as coral reefs and mangroves are highly value assets to the tourism and fisheries industries. The rich biodiversity offered by coral reefs draw in snorkelers, divers, and sport fishermen from various parts of the world. UNEP (n.d) estimates the reef recreation value in the Caribbean as roughly US\$1,654 per hectare per year. These 'rainforests of the sea' are among the most threatened ecosystems on Earth, as global temperatures and ocean acidification increase, combined with existing anthropogenic pressures associated with local development, resulting in loss of ecosystem services, coral bleaching and mortality (IUCN n.d). As reefs lose their biodiversity and integrity, they also lose their attractiveness to tourists, who will be less inclined to spend money to visit degraded reefs. Reefs are further impacted by physical damage due to increased frequency and severity of hurricanes. Degraded reefs host fewer reef associated species available for supply to local restaurants, desirous of serving local cuisine to tourists.



4.2. Current Environmental Threats and Tourism Pressure

As described in the STOREM project's research report (D1.1) on national issues and environmental threats in coastal territories of the project's partner countries, there are multiple impacts on Colombia's natural resources that present pressures on coastal tourism. The natural environment and climate are principle draws for tourism in the Caribbean (Cashman et al. 2012), including the attractions of beaches, rainforests and coral reefs. The touristic allure to these places is largely based on the conservation of their natural condition. However, there are many threats to the conservation of these natural resources, including pollution, deforestation, urbanization, flooding, landslides, coastal erosion, intensified storms, sea-level rise, drinking water availability, droughts and maritime activities. Touristic activities themselves contribute to various of these pressures, while many of these issues are further exacerbated by climate change as well. These pressures have already resulted in significant impacts on the coastal natural resources, ecosystem loss and public health risks, all of which in turn present a significant threat to the sustainability of tourism-related activities.

4.3. Pollution

Across the Caribbean region, the management of domestic and industrial waste (solid waste, wastewater and atmospheric emissions) is ineffective due to limitations in policy, management and monitoring. Inadequate management of household waste is one of the main environmental problems in Colombia and around the Caribbean. This situation is particularly serious in rural areas, where solid waste is usually burned or deposited in uninhabited places or in riverbeds, causing significant environmental impacts and enhancing the proliferation of disease vectors that put at risk the health of the most vulnerable population. Ineffective solid waste management can have a disastrous impact on the coastal environment, such as in mangroves where the accumulation of debris can cause obstruction of water circulation and limiting mangrove growth (Failler et al. 2010).



Water pollution in coastal areas and in upstream watersheds has a significant impact on coastal water quality, marine ecosystems and touristic beaches (Tosic, 2018). In Cartagena Bay, water pollution has been linked to sedimentation from upstream watersheds, heavy metal contamination, the discharge of untreated wastewater from coastal populations, industrial effluents and maritime traffic activities. These pollution sources have results in problems of hypoxia, metal contamination in fish, fecal pollution in swimming waters, eutrophication, marine ecosystem degradation and the occasional presence of hydrocarbons and chemical spills.

Even at the regional level of the Caribbean Sea, only 15% of all sewage is treated, due to an inadequate number of operating sewage treatment plants, poor operating conditions and poor disposal practices of mostly untreated wastewater (GEF-CReW n.d). This is a serious health threat not only to locals, but to tourists who visit the region, expecting to find a pristine and healthy environment. If inaction continues, there could be a significant impact on the touristic demand in the region.

Pollution flowing from upstream watersheds are equally important. Untreated sewage effluents, along with excess runoff of nitrogen and phosphorus compounds used in agriculture fertilizers and pesticides, flow to the sea via rivers and land surface runoff. When these waters arrive to the coast, contaminants are released into the marine environment, including nutrients and other pollutants that are detrimental to marine ecosystems. Excess nutrients promote algal growth that can lead to eutrophication and low oxygen levels. The process of eutrophication affects the aesthetics of the environment and impacts coastal ecosystems, such as coral reefs, seagrass, mangroves and local fisheries (OECS 2009). Sewage has been identified as one of the main factors contributing to the loss of approximately 80% of living coral in the Caribbean over the last twenty years (GEF-CReW n.d).

One such example in Colombia is the Canal del Dique, which flows from the Magdalena River to Cartagena Bay. This canal is a strategic body of water for the economic, social and environmental development of the region. But this hydrological system presents multiple problems due to the transport of large quantities of



sediments, nutrients, fecal coliforms, solid waste and other contaminants to the coast. All these contaminants impact negatively the populations settled on this body of water since it reduces the quality of the water resources for human consumption and for the conservation of biological diversity, while downstream at Cartagena Bay the pollution impacts the marine ecosystems, artisanal fisheries, and ecosystem services utilized for tourism, such as beaches and dive sites.

Rivers, streams, mangrove and coastal zones have been repository sites for increasing amounts of solid waste such as plastics, glass, metal and other materials, having considerable impacts on marine life. Poorly managed landfills in close proximity to the coast can become sources of debris, especially during periods of rainfall, where waste is flushed into marine environment (UNEP, 2001a). Scientists and researchers have documented a rising number of injuries and in worst cases, death, among fish, marine mammals, endangered sea turtles and sea birds, due to entanglement and ingestion of solid wastes, thus having implications on biodiversity (UNEP, 2001b). It is important to note that this is a transboundary issue due to the movement of the ocean, therefore release of wastes from the coasts of one country, may ultimately arrive to coastal waters of a neighboring country, stressing the need for regional collaborative action.

4.4. Deforestation

One of the greatest impacts on watershed runoff is deforestation. The large amounts of mobilized sediment from watershed runoff accumulate in coastal waters where they impact the marine ecosystem in multiple ways. Sediments settling on coral reefs smother and suffocate the corals while favouring the growth of macro-algae. Sufficient sediment accumulation can also burry seagrass beds and benthic organisms, while increasing turbidity that reduces coral photosynthesis and also impacts beach aesthetics. Siltation is one of the main causes of degradation and the loss of biodiversity of coastal and marine ecosystems (Moulet and Saffache, 2013).



Deforestation, and land cover change in general, has a large impact on runoff water quality as it increases runoff rates (Leitch & Harbor, 1999), while it uproots vegetation, loosens and exposes soil along with any contained nutrients which are then very susceptible to transport via runoff (Fredriksen, 1971). Mining activities not only result in land cover change, but also involve chemical processes, such as mercury amalgamation, which can further contaminate the downstream waters.

In Colombia's most populated watershed, that of the Magdalena River, 79% of the catchment is classified to be under severe erosional conditions, and an intense rate of deforestation, as more than 70% of natural forests were cleared between 1980 and 2010 (Restrepo et al., 2015). In the mining areas of southern Bolívar, the presence of environmental authorities has been very scarce, which has led to a significant amount of illegal mining activities, without any type of planning, resulting in negative implications for the environment and the population. During the gold extraction process, most miners use mercury, cyanide and nitric acid, many of which are discharged without any treatment into water bodies near the mines.

4.5. Urbanization

The conversion of natural lands in general, such as is the case of deforestation, increases runoff and the delivery of sediments, nutrients and contaminants to the coastal zone. The conversion of natural lands to urban areas holds this risk along with the additional impact of construction and under-developed infrastructure (e.g. untreated wastewater discharges). In Cartagena, Colombia, land use conversion has also impacted the community structure of coastal vegetation as the city's growth has resulted in reduced biodiversity in the wetlands of the Ciénaga de la Virgen lagoon. The mangrove ecosystem has been strongly impacted by indiscriminate logging and filling of wetlands areas, caused by the cumulative impacts generated by discharges of sewage and solid waste, which have decimated populations of flora and fauna.



The coastal resources utilized by the tourism sector, such as drinking water and beaches, are often impacted by tourism itself due to inadequate infrastructure and management. Ironically, the Caribbean tourism sector, which is heavily reliant upon environmental quality, is the leading threat to its degradation and in some cases causing irreparable damage, consequently bringing losses to the tourism sector (George 2007). Habitat destruction and alteration is one of the primary causes for the loss of biodiversity (UNEP 2001). Rapid and uncontrolled coastal tourism uses and modifies fragile coastal resources for construction of general infrastructure including roads, marinas, airports and tourism facilities such as hotels, resorts, restaurants, shops, to attract tourists. Such tourism development however, affects the quantity and quality of coastal resources available for present and future tourism activities.

Unmanaged development such as construction and sand mining can also destroy critical sea turtle nesting habitats. These endangered species, are further threatened by artificial lighting from coastal buildings which attract emerging hatchlings, causing disorientation away from the sea. Tens of thousands of hatchlings perish yearly as a result (Lorne and Salmon 2007).

4.6. Continental Flooding

Colombia has the third highest rate of natural disasters among the countries of Latin America and the Colombian Caribbean is particularly vulnerable to these disasters. The risk of flooding is acute in the eastern part by inappropriate landfills of the existing marshes between Sabanagrande and Soledad, restricting the water mirror and, consequently, causing flooding of urban areas, affecting in particular sectors with very vulnerable population. It was, perhaps, the region most affected by the 2010 La Niña rainy season, when it registered 1.6 million victims and 308 thousand homes impacted by vast continental floods. The intensification of watershed runoff leads to the massive transport of terrigenous sediments into coastal waters (Ismaili



2010, Saffache 2014), reducing coral and seagrass productivity, and suffocating them in extreme cases of water turbidity (Saffache 2014).

4.7. Landslides

Erosion processes are particularly hazardous to waterways and the coastal zone. In some cases, landslides can occur resulting in significant damage to both the environment and human infrastructure, and the loss of life. Deforestation is one of the main causes to such landslides as the sediment becomes loose and unrestrained by the roots of vegetation. Flooding is another factor that will increase the probability of landslides. This results in a combined effect as both of the factors that increase landslides (deforestation and flooding) are prominent in the Colombian territory. Some coastal areas in Colombia where this phenomenon usually arises include the coastal subregions of Tubara and Juan de Acosta, the Momposina depression, and the municipality of Usiacurí.

4.8. Coastal Erosion

Erosion of the Caribbean coastline is an already recurrent phenomenon in all of the Colombia Caribbean. It has been estimated that 30% of the 233 km² of beaches in the Colombian Caribbean are affected by this phenomenon. The accumulation coasts are eroded by sedimentary pullout (dune levelling, beach erosion), while powerful swell undercuts rocky shorelines. Furthermore, the effects of flooding and sea-level rise exacerbate the process of coastal erosion, while deforestation and urbanization remove littoral vegetation that is needed to stabilize and trap sediments in the coastal zone.

Coastal erosion affects touristic activities in many ways, making it one of the principal threats to the sustainability of the tourism sector. On the one hand, erosion reduces the amount of available coast area that can be used for touristic activities, as a beaches area can be drastically reduced by this process. A good example of this is the beach Playa Blanca in the Colombia department of Cordoba, which at once was



a very popular touristic beach, but has since disappeared due to erosion. Another great impact is on touristic infrastructure as hotels and other service providers risk losing their property. There is also an impact on the municipalities economy, as coastal erosion creates the demand for works of stabilization and containment projects. Lastly, coastal erosion can also have an impact on the demand for tourists due to the effect of making the coastline less aesthetically pleasing.

4.9. Storm Surges

Marine-weather events often create large storm surges that can damage coastal ecosystems. Such surges can uplift seagrass meadows and destroy coral colonies due to the physical impact of waves (Saffache 2014). Coastal ecosystems can also be damaged as waves and wind can level sand dune ridges (Vernier, 2010), knock down mangroves, and flood coastal wetlands, thus eliminating their role as buffer zones (ECLAC, 2018), which in turn increases coastal erosion.

The effects of climate change have already had devastating impacts on Caribbean economies and according to WTTC (2018), as 2017's hurricane season resulted in an estimated loss of 826,100 visitors which had the potential to generate US\$741 million. While the Colombian coastline is rarely exposed to direct contact with hurricanes, tropical storms offshore in the Caribbean cause significant swells that are carried to Colombia's coast. Climate change's effect of increased temperatures directly increases the likeliness of tropical storms in the Caribbean, as they are dependent on two conditions: 1) the presence of an atmospheric depression; and 2) water temperature above 26°C up to 50 m of depth (Bohle 2014). Climate change is causing the critical threshold of 26°C to be reached at increasingly closer intervals. Thus, over the period 1975-2004, the number of hurricanes of category 4 and 5 has increased by 56% (Dupont, 2013) and the IPCC predicts a persistence of the trend to intensification by the horizon of 2100.



4.10. Sea-Level Rise

Accelerated sea level rise has been identified as the most significant impact of climate change for beach systems, which are undoubtedly a major part of the tourism product. Sea level rise can lead to beach erosion and beach loss, as well as damage to tourism infrastructure due to sea encroachment into low-lying areas (Cashman et al., 2012). Sea level rise, compounded with increased severity of storm surges associated with tropical storm activity, will have direct impacts not only on the level of expenditure required to protect coastal properties and infrastructure but also on the funds needed for greater marketing effort to safeguard the attractiveness of coastal properties and attractions. With projections of further sea level rise, beach erosion is expected to continue and possibly increase (Cambers, 2009).

This is especially concerning for low-lying islands, such as the Colombian islands of San Andres and Providencia, or the protected areas of the Rosario and San Bernardo Islands near Cartagena, which the large majority of the economies are dependent on coastal tourism. Due to the low elevation of these coastal areas, floods and sea level rise will be particularly damaging to infrastructure, industries and roads that are located at sea level. Sea water could contaminate inland freshwater systems, which supply 82% of potable water for the island of San Andres.

4.11. Water Supply & Public Health

Colombia has the sixth greatest water supply among countries around the world. However, approximately 50% of these resources have water quality problems due to the aforementioned issue of pollution. On the other hand, droughts are also common in the Colombian Caribbean, particularly during the El Niño phenomenon of the ENSO cycle. Droughts cause a stress on the availability of water resources, and in drastic cases, the depletion of the resource. Reduced water levels can also affect the reservoirs for the generation of electric power, which can thus result in impacts on the quality of life of the communities and security.



As in most Caribbean countries, Colombia's problems related to atmospheric and water contamination have increased in recent decades (MinAmbiente, 2012). These environmental impacts go beyond affecting tourism as they extend to general health issues at a national level; in the 1990's atmospheric and water contamination were considered to cause health issues to 25-33% of the population, particularly with children below the age of 5 (WHO, 2012). As such, the country's second-leading health cost has been deemed those related to poor water quality, natural disasters, atmospheric contamination and land degradation due to agricultural use (Larsen, 2004). In 2009, these health problems related to the state of the environment accounted for 2% of the gross domestic product of Colombia (Golub et al., 2014). Recent studies in Cartagena, for example, have also shown health impacts associated with metal contamination in fish (Restrepo & Tomic, 2017). Indices of the health and benefits of coastal ecosystems have shown that most aspects (economy, biodiversity, water quality, coastal management, nutrition and tourism) are below worldwide average scores (Halpern et al., 2012).

Over the past decade, the number of outbreaks of vector-borne diseases have been increasing, raising many public health concerns, especially in highly urbanized territories (Githeko et al. 2000). Recent altered ecologic conditions, due to changes in global climate (increasing temperatures and rainfall), globalization of travel and trade, urbanization and increased waste management issues, all set the stage for the expansion of vector-borne diseases (Leslie et al. 2017). As climatic conditions rapidly change, increased water temperatures, will likely promote precipitation and flooding which present ideal breeding conditions for vector-borne diseases such as dengue, Chikungunya and Zika, formerly identified as epidemics in the Caribbean.

Apart from the social and climatic contribution to the incidences of vector-borne diseases, the vectors themselves are biologically changing. Mosquito vectors, such as the *Aedes aegypti* mosquito are sensitive to changes in temperature. Studies reveal that in warmer temperatures, female mosquitoes feed more often and digest blood faster, thereby increasing the intensity of transmission (Githeko et al. 2000).

To exacerbate the issue, not only are mosquitoes adapting to warmer climates, but



their larvae are also adapting. Mosquito larvae decrease their maturation time as water temperatures increase, consequently reaching adulthood faster (WHO).

With Caribbean economies being highly tourism dependent, outbreaks of vector-borne diseases can have serious implications on the Caribbean's tourist destination image. This has already been observed during the Zika outbreak where numerous foreign travel health advisories were released by international governments, informing their citizens of the outbreak. Tourists' perception is greatly influenced by media coverage and if potential tourists perceive the health risks of a particular destination as high, the individual may be more inclined to seek another safer destination. This was demonstrated with Reunion Island where the 2006-2007 Chikungunya outbreak reduced tourism arrivals by 37% (Caribbean Council n.d).

4.12. Climate Change

Many of the aforementioned issues can be exacerbated by climate change. Rising temperatures and changing weather patterns can result in increased flooding, droughts, sea-level rise, storm intensification, as well as ocean acidification and coral bleaching. These effects in turn result in increased landslides, coastal erosion, and ecosystem loss. Colombia has been rated as the third country most vulnerable to the impacts of climate change. According to future scenarios projected by the IDEAM, the Colombian Caribbean region will have drastic temperature increases due to a strong decrease in precipitation. However, the combination of continental deforestation and intensified precipitation events in upstream mountainous watersheds can result in increased flooding and pollution in the coastal area.

Climate change implies a rise in atmospheric temperatures. The moderate scenario of the IPCC (scenario A2) for the Greater Caribbean region predicts a variation of temperatures of + 3.55° C by 2090 horizon. The rising temperatures cause the melting of ice and thermal expansion of the oceans leading to relative sea-level rise. These already alarming results yet minimize the reality since they do not take into account the cumulative impacts of a potential storm surge, nor the aggravation of



coastal risks by the disturbance of coastal ecotones (mangroves, swamp forests, dune systems) and especially their hydrological mitigation function.

In the same time, Colombia's coastal areas have a high potential for disasters occurrences due to climate change, among those are floods, droughts, strong winds, sea-level rise and landslides. Local communities, especially the poor ones, are the most affected due to their location and the low quality of their households. Thus, it has been estimated that by 2030, 2% of Colombia's coastal population will be victim of one or more aspects of climate change (MinAmbiente, 2018).

In continental regions such as Atlantico, la Guajira and Magdalena, the existence of serious environmental imbalances with severe manifestations in the temperature and the wind regime, along with alternating extreme periods of rain and drought, such as the registered during the El Niño phenomena have been already happening in the last decade (NECCC, 2011, Rodriguez, 2013), which allows scientists to predict the growth of La Guajira desert to almost double its present extension (PDA, 2016). Low levels of the Magdalena river by great part of its trajectory throughout the Colombian Caribbean region, opposed to events such as the catastrophic flooding in the South of the region in the year 2010, highlights the magnitude of the problem, demonstrating the risks of the management of geological hazards and water shortages. By 2050, the loss of $\frac{3}{4}$ parts of the glacial ice coverage at the Sierra Nevada de Santa Marta, will dramatically affect several ecosystems from the páramo to the dry forests (Bueno et al., 2008). Forests are crucial for the caption of carbon and therefore, for the mitigation of climate change. But, rain and dry forests growth will be limited, their mortality rate will increase, as will forest fires (Instituto Humboldt, 2014).

In marine ecosystems, the rise in temperature, the hurricanes, and the sea swells have dramatically affected coral reefs coverage, affected by bleaching episodes. These factors, along with coastal erosion and the unbalance in fresh- and seawater, have an impact on estuarine ecosystems trough the decrease in mangrove both in



the Caribbean and the Pacific coasts (Urrego et al., 2013; Riascos et al., 2018; Taillardat et al., 2018; Jaramillo et al., 2018; Castaño-Isaza et al., 2015).

The biological richness of the region is eroding and this trend will continue as the effects of climate change will intensify (ECLAC, 2018). Endemic species in the Caribbean mature in very specific environmental conditions and thus have a limited biogeographical area. However, climate changes alter the limits of these biogeographic areas resulting in a shift in species, and sometimes a loss, or even a total disappearance of these (MEF, 2015). The change of temperature and regime of sea currents will also affect the distribution of marine species (Ismaili, 2010), significantly altering fish stocks.

The rising temperatures affect coral reefs through coral bleaching phenomenon. During heat stress, the coral polyps expel the symbiotic algae living in their tissues, causing coral bleaching. This bleaching causes a physiological downturn of the coral (Failleret al., 2010). The IPCC regional estimates predict 75% of additional coral bleaching by 2050 (Dupont, 2013). The massive bleaching of constructive coral species (*Orbicella* SP., *Montastraea* SP., *Acroporapalmata*, *Acroporacervicornis*) leads to a significant decline of biodiversity and population in fish (Romon, 2018). Moreover, the decrease in grazer species accelerated the transition from a coral-dominated system to macroalgae-dominated system. This transition has been widely permitted by the disappearance of key Caribbean species of sea urchin: *Diademaantillarum*, due to an epizootic disease occurring in 1983 (Romon, 2018).

4.13. Impacts Caused by Tourism

The growing number of tourists visiting the Caribbean is causing various issues, notably social, economic and environmental ones. The spatial concentration of tourists exacerbates degradation of natural resources and raises questions about profit distribution, urban planning, access to drinking water or waste management (Dehoorne, Saffache et Augier, 2007). For this reason, several studies and political



strategies are becoming more focused on sustainable tourism and ecotourism in response to these problems.

Colombia has increasingly begun to be seen as a tourist destination with great natural and cultural heritage potential. The coastal environments that form part of the country's high diversity (seagrass, beaches, reefs, sandy soft bottoms, wetlands and coastal lagoons) are affected by the tourism (Enriquez-Acevedo et al., 2018). These impacts are due to direct causes such as careless snorkeler and SCUBA diver contact, boat anchoring, species extraction and direct contact of tourist with the reefs (Castro & Pereira, 2016; Jacob-Lozano & Echeverry-Galvis, 2019). Meanwhile, the growing tourist population places a stress on local infrastructure, such as drinking water availability, wastewater volume, solid waste disposal and urban planning, all of which in turn have indirect impacts to the marine ecosystem and public health.

4.14. Maritime Activities

One of the types of impacts caused by tourism are those due to nautical and aquatic activities. When these activities aren't controlled, they can be very impactful on the marine environment. In the absence of regulation of mooring areas, unwanted anchors shear corals (Romon, 2018) and tear up the seagrasses. Diving and the installation of traps contribute to damage the physical structure of marine-coastal ecosystems.

Furthermore, there are a wide variety of maritime activities that occur near port areas that also negatively affect the marine environment. Activities such as cause direct physical damage to marine benthic ecosystems, such as the fragile coral reefs. Man-made coastal structures can also create barriers in ecosystem connectivity. The presence of maritime activities also implies an increase in marine pollution due to wastewater discharges and occasional spills of oil and chemicals, some of which are accidental, others of which are planned (operational).



4.15. Need for Improved Watershed and Coastal Management

The protection of the Colombian Caribbean's valuable ectouristic areas, including its natural parks and beaches, is dependent not only on the management of the specific sites themselves, but also on the management of the upstream watersheds and coastal areas in general. The water continuum that connects watersheds with the coastal zone represents an essential concept to environmental processes, making the integrated management of these areas of utmost importance. A lack of integration and general limitations in watershed management and coastal management are considered to be a principal problem in policy design and the implementation of environmental actions in Colombia.

Watershed management in Colombia and across the Caribbean present a particular challenge due to political and geographic divisions of areas that are in reality connected by the water continuum. In order to control upstream sources of pollution, including point source discharges and the runoff of sediments, nutrients and pesticides, there is a need for improved understanding and effective management of the concepts of hydrology and water resources at the basin-scale. This also includes the management of land practices (e.g. agriculture) and land use change (e.g. deforestation, urbanization). Adequate management of coastal territories is also essential due to their proximity to coastal touristic destinations and the key role of coastal wetlands and mangrove forests as buffer zones to protect the marine environment from the flux of freshwater and sediments flowing from upstream watersheds.

Given the priority that Caribbean tourism places on the coastline, there is a clear need for improved coastal management in Colombia and the region in general. Two of the main threats to sustainable tourism in coastal zones are: 1) the loss of coastal land area, and 2) environmental degradation. Coastal land area can be lost due to sea-level rise and the natural process of erosion, which are accelerated by continental flooding, storm surges, and climate change. Degradation of the coastal



environment encompasses impacts caused by pollution, urbanization, maritime activities, and uncontrolled touristic activities such as snorkeling and diving.

Coastal management has been out-paced by the rapid growth of tourism, which has led to informal land ownership for hotels building without having the infrastructure for basic needs. Tourist activities have thus been developed without the necessary organization and cooperation between local communities, government agencies and tourism operators, making the implementation of improved practices crucial for the health of the environment (Alfonso et al., 2013; Cortés-Leal & Aranda-Camacho, 2017). Improved coastal management should implement strategies that empower local communities as guardians of natural and cultural heritage, making these communities key tourism stakeholders through the adoption of a new “tourism consumable identity” (Guilland & Ojeda, 2012).

4.16. Existing Training Paths in Colombia

The following part of this report, based on the previous STOREM report D1.3, reviews the existing training paths available for Master’s studies in Colombia on the subjects of sustainable tourism and environmental management. The D1.3 report identified 153 programs on the subjects of tourism and resource management. These included 42 programs on tourism and 111 programs on resource management, including programs on environmental management (75), geology/natural sciences (29) and natural resources (7). However, of the 153 programs found, only 25 of them are at the Master’s level.

All 25 of these Master’s programs have thematics relevant to the STOREM pathway. With regards to Tourism, there is only 1 masters level program in Colombia: Masters in Planning and Tourism Management at the Universidad Externado de Colombia in Bogotá. The course list of this program appears to be quite thorough, covering various elements of management, culture and society, such as:

- Tourism theory
- Ethics and environmentalism



- Culture and society
- Theories and models of tourism planning
- Regional and local development of tourism
- Formulation and evaluation of public policies
- Governance
- Innovations in public management
- Negotiation and conflict resolution
- Valorization of cultural and natural heritage
- Economic valorization of the territory
- Sustainability management

The other 24 Master's programs in Colombia identified in the D1.3 report are all focused to some extent on environmental resource management. Some of the courses offered by these programs are quite relevant to the STOREM pathway and cover some important aspects of watershed and coastal management. Across these 24 different Master's programs, some of the more relevant courses in particular have been identified in the following list:

- Environmental management
- Water management
- Solid waste management
- Ecology
- Sustainable urban development
- Land planning and risk management
- Social innovation
- Tourism policy and legislation
- Ecotourism and sustainable development
- Methodological bases for the measurement of sustainability
- Climate change and sustainable development
- Cultural practices and sustainable development

However, none of the aforementioned courses directly address watershed management or coastal management, which are two of the essential training needs in Colombia in the context of the STOREM pathway. The only such training paths found in Colombia are at educational levels different to Master's studies. For



example, at the doctoral level there is a PhD program on Watershed Management and Planning at the University of Tolima. The only mention of coastal management found is that of a technical specialization from Colombia's Naval School which offers two programs specifically on coastal management, though this is aimed directly at naval career paths.

The most applicable Master's program in Colombia to the thematic of watershed and coastal management is EAFIT's Master's Program in Earth Sciences (MCT), the only program of its kind in the country. It aims at delivering advanced training in the knowledge and analysis of the natural processes that model landscapes and in the application of this knowledge to the development of basic and applied research projects and to the environmental management. The program offers the opportunity to develop advanced research in different fields of Earth Sciences, including: Environmental geology, coastal geomorphology, geochronology, sedimentology and stratigraphy, paleoceanography and biostratigraphy, geophysics and basin analysis, coastal oceanography, mineral resources, fluvial processes and natural risks.

4.17. Gaps in Existing Training Paths

The analyses of this report have identified that there is a lack of training paths available in Colombia at the Master's level on the subjects of watershed and coastal management. While there is substantial availability of Master's programs on environmental resource management (24) and one Master's program specifically on tourism, none of these programs offer courses on watershed management nor on coastal management, which are two essential aspects of the STOREM pathway given their importance for environmental protection and sustainable tourism. This represents a weakness in the academic offer existing in Colombia, as improved capacity in aspects of watershed and coastal management are urgently needed to protect the country's natural coastal resources and to support touristic sustainability. Therefore, this analysis justifies the need to develop new courses on these subjects. These new courses designed in the context of the STOREM pathway will be



developed for EAFIT's Master's Program in Earth Sciences, which is the most applicable Master's program in Colombia to the thematics of watershed and coastal management. As such the two following new courses have been defined to be developed during the STOREM project:

- Watershed Management for Environmental Protection
- Coastal Management for Sustainable Beach Tourism

The academic staff at EAFIT's Department of Geology is highly qualified for the development and teaching of the two newly defined courses. Aspects of improved watershed and coastal management, such as those identified in the first part of this report as current environmental threats (pollution, deforestation, flooding, coastal erosion and sea-level rise) are among the expertise of the teaching team of EAFIT's Master's Program in Earth Sciences. This academic staff has achieved recognition in these subject areas through research, publications and teaching at the undergraduate, Master's and PhD level.

Perhaps an opportunity for further capacity building of EAFIT'S academic personnel could be with regard to the theme of sustainability, specifically in the context of tourism. For example, the Sustainable Tourism Management course (MGMT 6126) offered at UWI-Barbados focusses on the principles of sustainable development, provides an understanding of the social, economic and environmental issues that will determine the future of tourism in the Caribbean, and imparts the skills needed to develop and manage the industry on a more sustainable basis in the years ahead. Another example is offered through UCI-Costa Rica's Master's Program in Sustainable Tourism Management, which incorporates integrated approaches involving local communities, determination of carrying capacity, environmental impact assessments, local organization, marketing, and other knowledge areas. The content of these types of courses could help to complement the experience of EAFIT's academic staff in the context of the STOREM project.



5. Orientations for a new master course – UWI

A revision of the existing sustainable tourism in the coastal zone course

Development of a new course in tourism and hazard mitigation planning.

The sustainable tourism in the coastal zone course is a critical component to the CERMES resource management degree in the Caribbean because tourism is the main income earner and it is located in the coastal zone. Preparing practitioners to deal with the challenges of tourism management and coastal zone management is therefore key. The objective of the course is to provide students with information and expose them to resources and experiences through which they will develop analytical and practical skills for the efficient management of coastal resources as part of the tourism product. The course has been running for several years now and it is time for it to be upgraded.

The course in tourism and hazard mitigation would assist tourism practitioners in the Caribbean in understanding how to address hazards that threaten the sustainability of tourism in the region. It would focus on natural and human induced hazards and would provide students with knowledge and skills to develop policies and plans for addressing these in the tourism sector.



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