



United Nations
Educational, Scientific and
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World Heritage Patrimoine mondial

43 COM

Paris, 9 October 2018
Original: English / français

**UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION**

**ORGANISATION DES NATIONS UNIES
POUR L'EDUCATION, LA SCIENCE ET LA CULTURE**

**CONVENTION CONCERNING THE PROTECTION OF THE WORLD
CULTURAL AND NATURAL HERITAGE**

**CONVENTION CONCERNANT LA PROTECTION DU PATRIMOINE
MONDIAL, CULTUREL ET NATUREL**

WORLD HERITAGE COMMITTEE / COMITE DU PATRIMOINE MONDIAL

Forty-third session / Quarante-troisième session

**Baku, Azerbaijan / Bakou, Azerbaïdjan
30 June - 10 July 2019 / 30 juin - 10 juillet 2019**

Item 7 of the Provisional Agenda: State of conservation of properties inscribed on the World Heritage List and/or on the List of World Heritage in Danger

Point 7 de l'Ordre du jour provisoire: Etat de conservation de biens inscrits sur la Liste du patrimoine mondial et/ou sur la Liste du patrimoine mondial en péril

MISSION REPORT / RAPPORT DE MISSION

**Monarch Butterfly Biosphere Reserve (Mexico) (1290)
Réserve de biosphère du papillon monarque (Mexique) (1290)**

29 January – 3 February 2018 / 29 janvier – 3 février 2018



MONARCH BUTTERFLY BIOSPHERE RESERVE, MEXICO

MISSION REPORT

29 JANUARY
3 FEBRUARY

2018

IUCN

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ABBREVIATIONS AND ACRONYMS

CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
CONAFOR	Comisión Nacional Forestal
CONANP	Comisión Nacional de Áreas Naturales Protegidas
DGIRA	General Directorate of Environmental Impact and Risk
FMCN	Fondo Mexicano para la Conservación de la Naturaleza
FOMAFUR	Fondo de Manejo del Fuego y Restauración
IUCN	International Union for Conservation of Nature
MBBR	Monarch Butterfly Biosphere Reserve
MF	Monarch Fund (Fondo Monarca)
PACC	Programa de Adaptación al Cambio Climático
PES	Payment for Environmental Services
PET	Temporary Employment Programme
PROBOSQUE	Protectora de Bosques del Estado de México
PROCOCODES	Programa de Conservación para el Desarrollo Sostenible
PROFEPA	Procuraduría Federal de Protección al Ambiente
SECTUR	Secretaría de Turismo
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales
SP	State Party
UNAM	Universidad Nacional Autónoma de México
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHC	World Heritage Committee
WWF	World Wide Fund for Nature



ACKNOWLEDGEMENTS

The mission would like to sincerely thank the Government of Mexico for its hospitality and cooperation. The mission would like to express acknowledgement in particular to his Excellency the National Commissioner, Mr. Alejandro Del Mazo Maza, as well as the authorities' representatives and professionals of each institution participating in the presentations, meetings and fieldwork visits held during the visit to the property.

The mission owes a debt of gratitude to Dr. Gloria Fermina Taverro Alonso and Mr. Felipe Meza, for their guidance and permanent support, and for sharing their first-hand knowledge about the MBBR.

We are particularly grateful to Ms. Maria Pia Gallina Tessaro, for her essential role in the preparation and organization of the mission.

The mission furthermore thanks the representatives of institutions, civil society organizations, consulting companies, and the private sector for sharing their views. All people consulted during the mission are listed in Annex 8.5; possible omissions are unintentional and exclusively the authors' responsibility.



EXECUTIVE SUMMARY AND RECOMMENDATIONS

The Monarch Butterfly Biosphere Reserve (MBBR) was inscribed on the World Heritage List in 2008 under criterion (vii) for representing the most dramatic manifestation of the phenomenon of insect migration. The World Heritage property comprises three components coinciding with the cores zones of the larger biosphere reserve. Already at the time of inscription illegal logging and forest cover loss were noted as significant direct threats to the Outstanding Universal Value (OUV) and integrity of the property and these concerns have been subsequently repeated in a number of State of Conservation (SOC) reports.

In 2017 the World Heritage Committee (Decision 41 COM 7B.16) requested the State Party to invite an IUCN reactive monitoring mission to the property to evaluate current and potential threats posed to the property's OUV by illegal logging and the proposed copper mining project in the vicinity of the property, and to assess its overall state of conservation and the protection of the Monarch butterfly overwintering areas located both within the property and in its vicinity. The mission visited the property between 29 January and 3 February 2018 and had the opportunity to both visit the overwintering colonies and evaluate the state of conservation of the property and to hold extensive discussions with a number of key federal and state institutions, civil society organizations and representatives of local communities (ejidos) on whose territory the World Heritage property is located.

Overall, the mission could observe that significant progress has been achieved in addressing the threats facing the property. The State Party should be commended for consolidating efforts in the field of prevention and detection of illegal activities, particularly illegal logging, thanks to efficient collaboration between different institutions (CONANP, PROFEPA and recently Environmental Gendarmerie) and involvement of local communities who now form local surveillance groups. Since 2008 incidences of illegal logging within the property have decreased significantly. However, the property remains vulnerable as cases of illegal logging still occur and therefore efforts to combat it will need to be sustained in the longer-term. On the other hand, these efforts also need to continue to be supported by actions aimed at providing alternative income generation solutions to local and indigenous communities on whose territory the property is located. Other potential or emerging threats, such as mining, will also require constant vigilance. In this regard, the mission makes the following recommendations:

1. Ensure that inter-institutional efforts to detect and prevent illegal logging activities within the property are sustained in the longer-term by providing sufficient resources to the agencies involved, including CONANP, PROFEPA and Environmental Gendarmerie, and by continuing the successful incentives programmes for the local communities, such as creation of local surveillance and patrolling groups.
2. Continue reforestation activities and expand them to all areas within the property that have been impacted by illegal logging activities and ensure that they

- continue to be supported by research programmes on the most appropriate reforestation methods and approaches.
3. Develop and implement additional surveillance programmes, as required, to address some of the emerging threats in the broader region, particularly deforestation due to illegal avocado plantations, in order to prevent them from impacting on the property.
 4. Continue programmes supporting involvement of local and indigenous communities in conservation activities and compensating them for not using forest resources, including through payments for environmental services.
 5. Develop additional ways of providing alternative income for local and indigenous communities, for example by promoting and diversifying sustainable tourism activities, including during the off-season, that could compliment Monarch butterfly observation and are more equally spread among all communities.
 6. Develop and officially register a common Monarch butterfly trademark that could be used to promote local sustainable products developed by local and indigenous communities.
 7. Ensure that no mining activities are permitted within the property by clearly defining the property as a no-go area for any mineral exploration and extraction and by developing strict regulations for any mining activities within the buffer zone of the MBBR in order to avoid any negative impacts on the property's OUV, including its conditions of integrity, through revision of the Management Programme of the MBBR or other relevant legislative instruments, in collaboration with all relevant agencies and authorities.
 8. Update the register of mining concessions overlapping the MBBR and any other areas outside it that may be occupied by overwintering colonies.

On the other hand, the mission observed that other threats have emerged more prominently since the inscription of the property. This is particularly true for those factors which negatively affect the Monarch butterflies along their migration route, including loss of breeding habitat (milkweed host plants) in the United States of America, as well as global threats, particularly climate change. A number of studies suggest that the decline in milkweed, the only host plant for the Monarch butterfly caterpillars, due to increased use of genetically modified more herbicide-resistant crops in the USA has contributed significantly to the decline of Monarch butterfly populations. However, others highlight that other stages in the lifecycle of the butterflies are equally critical. Therefore, while ongoing efforts are required to ensure that threats affecting the property at the local level continue to be addressed, the long-term preservation of the property will also depend on the capacity to address threats alongside the entire migration route of the Monarch butterfly. Since this can only be achieved in collaboration with the States Parties who share the migration route, the mission makes the following recommendations to the States Parties of Canada, Mexico and the United States of America:

9. Continue and, where necessary, strengthen trilateral cooperation in the field of Monarch butterfly conservation, including within the framework of the North American Monarch Conservation Plan, and accelerate actions aimed at minimizing threats to the Monarch butterfly along its migration route, paying particular attention to the measures required to minimize the loss and to restore the range of native milkweed species in the United States of America.

Finally, while a more in-depth analysis and discussion of the measures required for climate change mitigation is beyond the scope of this mission, the mission considers that certain measures can be undertaken at the local scale in order to ensure that all overwintering areas, both historic ones and those which are becoming more frequently used by the butterflies, have the appropriate level of protection in order to ensure that there is certain potential for adapting to changing climatic conditions. In this regard, the mission makes the following recommendations to the State Party of Mexico:

10. Develop an adaptive management approach for the Monarch Butterfly Biosphere Reserve, based on robust monitoring data, which identifies options for climate change adaptation, including for the plant species important for the Monarch butterfly, particularly the Oyamel fir.
11. Develop and expedite a proposal for an extension of the property to include all areas occupied by overwintering colonies of Monarch Butterfly currently located outside the property (such as those within Valle de Bravo Natural Resources Protection Area, Nevado de Toluca Flora and Fauna Protection Area, Izta-Popo National Park and La Malinche National Park), in order to increase the potential of the property to adapt to changing climatic conditions and associated changes in the distribution of overwintering colonies.

BACKGROUND TO THE MISSION

Inscription history

The Monarch Butterfly Biosphere Reserve (MBBR) was proposed for inscription under criteria (vii) and (x). IUCN considered in its evaluation report (2008) that the nominated property did not meet criterion (x), and recommended to defer the nomination to allow the State Party to address integrity issues. The World Heritage Committee decided to inscribe the property on the basis of criterion (vii), recommending the State Party to inform it about resources invested in management and conservation activities with the emphasis on actions aiming to halt illegal logging.

November 2007	Field evaluation mission
April 2008	IUCN evaluation report
July 2008	World Heritage Committee decision 32 COM 8B.17

Inscription criteria and World Heritage values

The superlative phenomenon of the Monarch butterfly (*Danaus plexippus*) migration is considered a classic example of two-way insect migration, involving millions of individuals, and is one of the longest insect migrations worldwide.



In late summer and fall, the eastern population of the Monarch butterfly migrates from Great Lakes region east of the Rocky Mountains in southern Canada and the United States to central Mexico. They usually arrive in late October-early November in the forests of Mexico, where they hibernate for around 5 months. Monarchs mostly form their colonies on Oyamel fir (*Abies religiosa*) and pine (*Pinus* spp.). These high mountain forests provide the microclimate needed for Monarch butterfly during winter. In December, the butterflies begin forming colonies with well-defined aggregations, called clusters. Each spring, in late

March-early April, they start migrating north from their overwintering sites.

The property (Monarch Butterfly Biosphere Reserve) inscribed on the World Heritage List does not encompass the Monarch butterfly migration route, but protects key

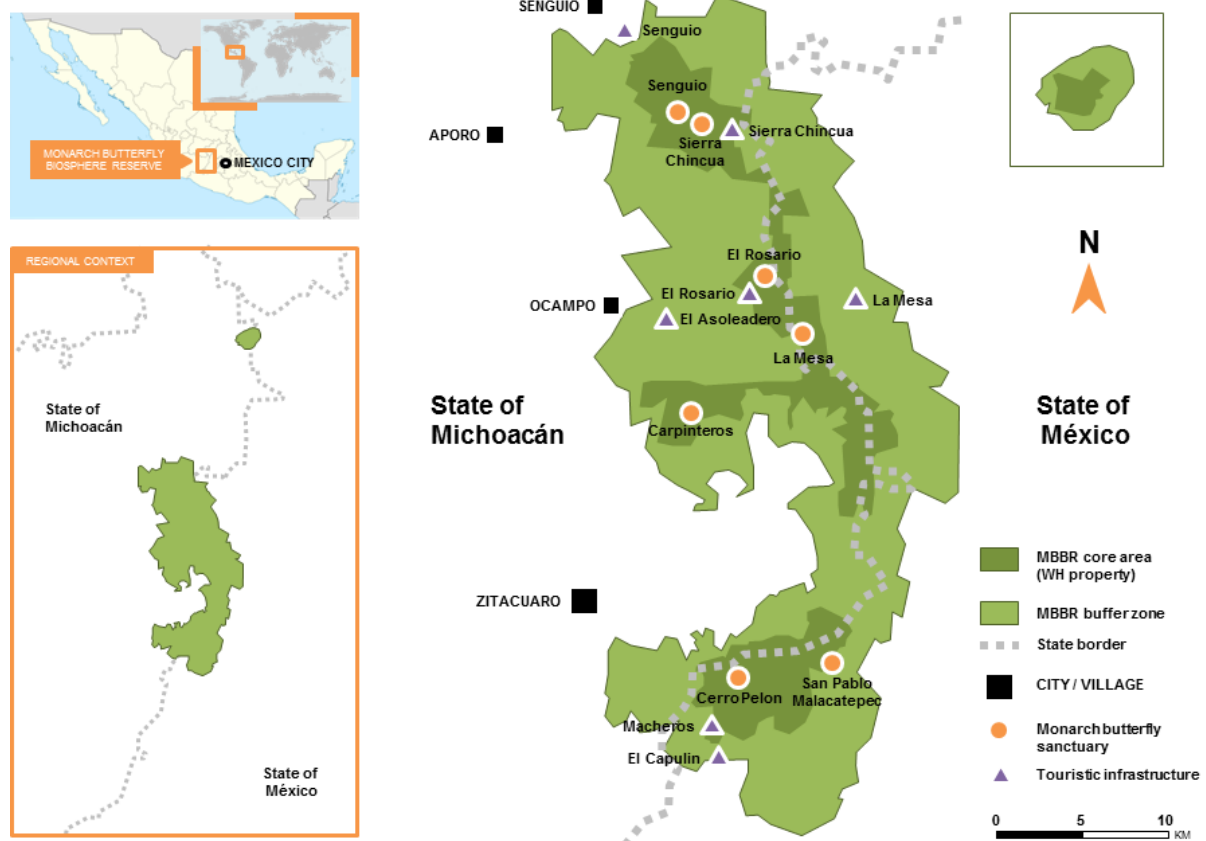
PHOTO 1



overwintering sites for the Monarch butterfly in Mexico. The millions of Monarch butterflies that return to the property every winter bend tree branches by their weight, fill the sky when they take flight, and make a sound like light rain with the beating of their wings. Witnessing this unique phenomenon is an exceptional experience of nature¹.

Criterion (vii): The overwintering concentration of the Monarch butterfly in the property is the most dramatic manifestation of the phenomenon of insect migration. Up to a billion monarch butterflies return annually, from breeding areas as far away as Canada, to land in close-packed clusters within 14 overwintering colonies in the Oyamel fir forests of central Mexico. The property protects 8 of these colonies and an estimated 70% of the total overwintering population of the Monarch butterfly's eastern population.

Map 2. Monarch Butterfly Biosphere Reserve



¹ <http://whc.unesco.org/en/list/1290> (Statement of OUV, Decision 32COM 8B.17)

Integrity issues raised in the IUCN evaluation report at the time of inscription

At the time of its inscription in 2008, the major threat to the Monarch Butterfly Biosphere Reserve was the continuing and significant forest loss due to rapid human population growth (the local population grew during the previous decade from around 500,000 to 780,000) and associated threats, such as logging, agricultural encroachment, expansion of human settlements, grazing, forest fires, pests, and indirect effects of tourism, with logging noted as the major threat.

At the time of evaluation, IUCN considered that illegal logging constituted a serious threat to the integrity of the nominated area and recommended deferral of the nomination, in order to allow the State Party to further focus on actions aiming to halt illegal logging in the core zones, including development of a coordinated plan, and working with local communities on environmental protection and development of alternative livelihoods.

Potential climate change impacts – in particular increased rainfalls during summer – were also mentioned in the report but not considered a major threat at that time.

Examination of the State of Conservation by the World Heritage Committee

Since the inscription, illegal logging has been an issue repeatedly raised in/through the State of Conservation reports. Despite measures and efforts undertaken by the State Party, the property remains vulnerable to this threat, while new issues emerged more recently, such as a proposed project for reopening a mine in the vicinity of the property.

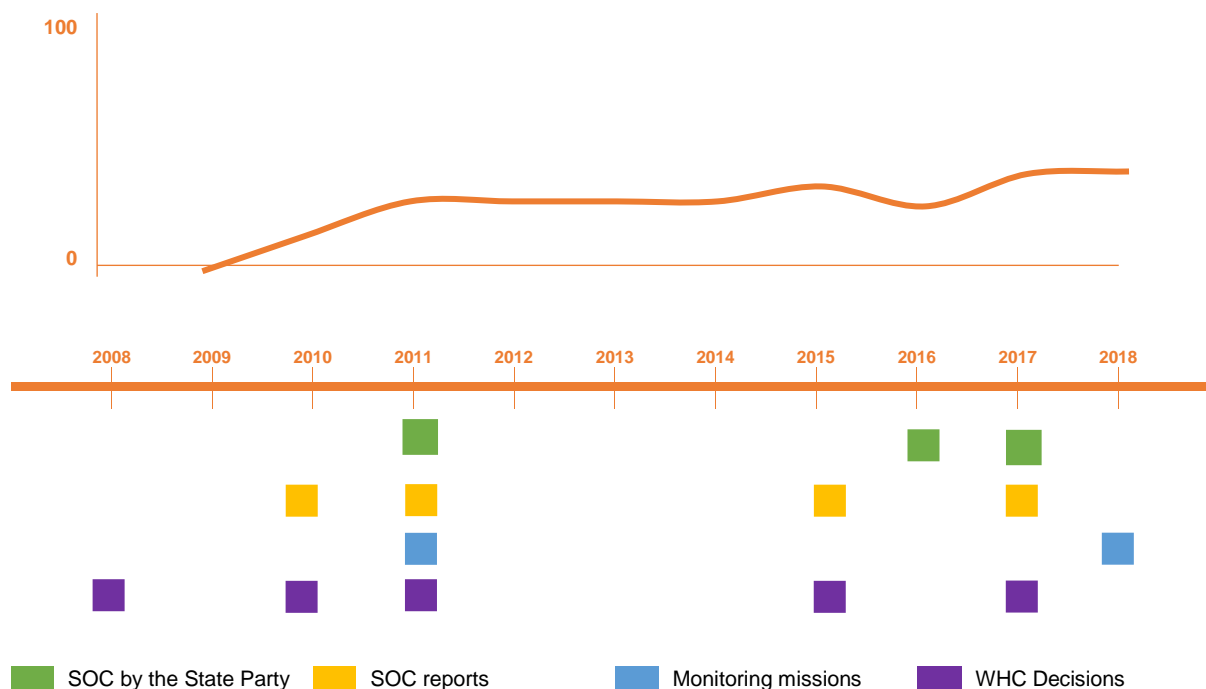
In its Decision on inscription in 2008, the World Heritage Committee noted that emphasis should be put on halting illegal logging and promoting sustainable tourism and development of alternative livelihoods for local communities. The Committee also requested the State Party to invite a joint World Heritage Centre / IUCN reactive monitoring mission in 2010 to consider the state of conservation of the property.

In 2010, the World Heritage Committee expressed again its concern that illegal logging continued to take place within the property. Considering that this issue clearly remained a critical threat to the property, the Committee requested that a joint World Heritage Centre/IUCN reactive monitoring mission focus on this issue. The joint mission visited the property in 2011.

In 2015, concerns were also expressed by the World Heritage Committee over the significant decrease in the area covered by overwintering colonies within the property. In 2016, the State Party submitted a report on the state of conservation of the property, with data showing a slight increase in the area occupied by overwintering colonies in the 2015/2016 overwintering season.

The significant efforts undertaken by the State Party to combat illegal logging were welcomed by the World Heritage Committee in 2017, but concerns were raised about plans for reopening of a copper mine in the vicinity of the property. Therefore, in its Decision 41 COM 7B.16 (2017), the Committee requested the State Party to invite an IUCN Reactive Monitoring mission to the property to assess these two issues, as well as the overall state of conservation of the property.

Figure 1. State of conservation reporting trend of MBBR (source: UNESCO)



Justification of the mission

The objective of this reactive monitoring mission was to “evaluate current and potential threats posed to the property’s OUV by illegal logging and the proposed mining project, and to assess its overall state of conservation and the protection of the Monarch butterfly overwintering areas located both within the property and in its vicinity”. The mission was conducted by Elena Osipova and Thierry Lefebvre representing IUCN.

In particular, the mission was asked to assess:

1. current and potential threats posed to the property’s OUV and integrity by illegal logging and the measures undertaken by the State Party to combat illegal logging;
2. current situation with the proposal to reopen a copper mine in the vicinity of the property and potential threats of such reopening to the property’s OUV and integrity;
3. the overall state of conservation of the Monarch butterfly overwintering areas located both within the property and in its vicinity;

4. any other relevant issues that may negatively impact on the OUV of the property, including its conditions of integrity and protection and management, in line with paragraph 173 of the Operational Guidelines.

The terms of reference of this mission, its itinerary and agenda can be found in Annexes.



NATIONAL POLICY FOR THE PRESERVATION AND MANAGEMENT OF THE PROPERTY

Protected area and national legislation

Mexican overwintering sites of the Monarch butterfly were first discovered by scientists in 1975 along the mountains of the Trans-Mexican Volcanic Belt, in the states of Michoacán and México. In 1986, five sanctuaries with a total area of 16,110 ha were officially designated as protected areas with the objective of protecting migration, hibernation and reproduction of the Monarch Butterfly. The area protected was expanded to 56,259 ha in 2000 with the establishment of the Monarch Butterfly Biosphere Reserve (MBBR)², which is located in two States – México and Michoacán. MBBR comprises three core zones containing the majority of the monarch's sanctuaries surrounded by buffer zones to ensure connectivity. The same area was recognized in 2007 under UNESCO MAB programme, before inscription of its core zones as a World Heritage property in 2008.

At a broader scale, Monarch butterflies are protected in Mexico by the Species at Risk Act, and are also categorized nationally as “species of special concern” by Canada's Species at Risk Act. In the United States of America, the species has no legal protection status at federal level, but is currently being considered for listing as threatened under the Endangered Species Act.

Institutional framework and management structure

The Monarch Butterfly Biosphere Reserve management system involves Federal and State agencies, local communities on whose territory it is located, with inputs from NGOs, academic institutions and a specific trust fund.

The coordinating agency is the National Commission for Natural Protected Areas (CONANP), a division under the Ministry of the Environment and Natural Resources (SEMARNAT). The same administrative framework applies for all the components of this serial site, located in two States: Michoacán (Municipalities of Aporo, Angangueo, Ocampo, Zitácuaro, Senguio, Contepec) and México (Municipalities of Villa de Allende, San José del Rincón, Temascalcingo, Donato Guerra). A regional committee has been established to ensure better coordination between both States for protection and restoration activities.

Civil society is represented through an Advisory Council, which integrates 21 representatives of rural cooperatives, communities and NGOs. The council assists CONANP in implementing the Management Programme and Annual Operational Plans.

² In Mexico, Biosphere Reserves are a national designation of protected areas and not all of them are also recognized as Biosphere Reserves under UNESCO Man and Biosphere programme

CONANP also works closely with other federal agencies, particularly in the field of law enforcement. One of these agencies is PROFEPA (Procuraduría Federal de Protección del Ambiente), another decentralized agency of SEMARNAT responsible for supervising compliance with environmental legislation. The recent establishment of Environmental Gendarmerie has significantly strengthened capacities for law enforcement and detection of illegal activities and this is discussed in more detail below.

Important inputs to the management of the property are also provided by NGOs, academic institutions and the Monarch Butterfly Fund. This 7,55 million fund was created in 2000, initially to purchase logging rights in the core zones before the establishment of the Biosphere Reserve, then as an economic incentive for the conservation of core zone forests. It is supported by the Mexican Fund for Nature Conservation (FCMN), the Federal Government, States Governments of Michoacán and México, NGOs (WWF) and individual donors (Packard Foundation).

At international level, Mexico, Canada and the United States of America have jointly developed the North American Monarch Conservation Plan (NAMCP) to protect and manage Monarch butterfly breeding habitats in North America and their over-wintering sites in Mexico. The three countries established a trinational high level Working Group in 2014 to review and update the NAMCP. They agreed on a roadmap to develop short- and long-term targets and to coordinate activities for knowledge and preservation of the migration of the Monarch butterfly. Three priority themes were identified: habitat conservation actions, research and monitoring, communication and education.

IDENTIFICATION AND ASSESSMENT OF ISSUES AND THREATS

Management effectiveness

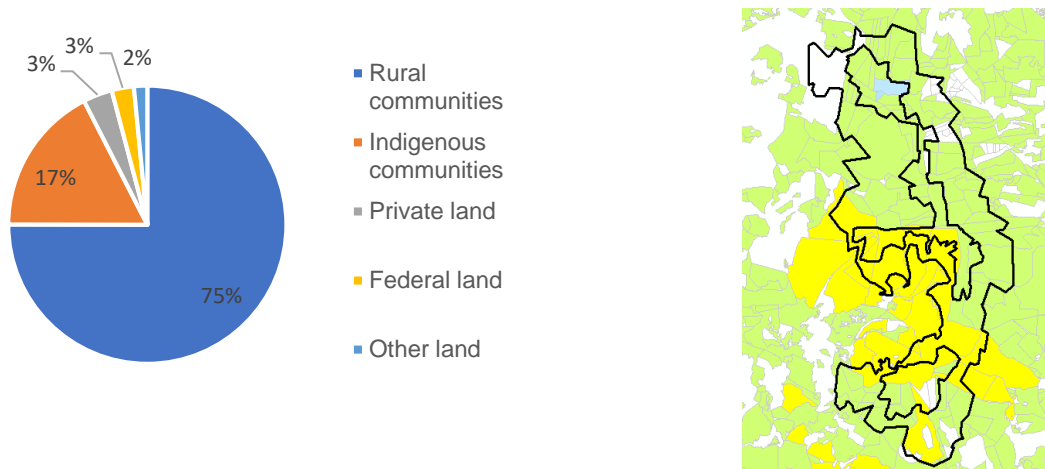
Management plan - The Biosphere Reserve's Management Programme adopted in 2001 sets policies and actions on wildlife management, sustainable development, public use, scientific research. Based on these orientations, annual operational plans guide day-to-day management activities (Action Plan, CONANP 2014-2022). Assessment of management effectiveness has been set up (SIMEC / Sistema de información, monitoreo y evaluación para la conservación), but data is not publicly available [see: <https://simec.conanp.gob.mx/efectividad.php>]

Surveillance – Law enforcement and prevention and detection of illegal activities, including illegal logging was reinforced by the establishment in 2016 of an Environmental Gendarmerie (*Gendarmería Ambiental*), through an agreement between SEMARNAT and the National security commission. Permanently based in the MBBR core zone, with its headquarters located in Llano de las Papas, Municipality of Angango, Michoacán, its 80 well-trained and equipped elements act to combat illegal activities within the sanctuaries in both States, in coordination with PROFEPA. Surveillance, control and prevention actions have contributed to decrease by 90% the presence of illicit activities. In complement, participatory vigilance committees have also been implemented by PROFEPA and CONANP, with the support of WWF, employing 1650 people from local communities for 8 months (January-August).

Monitoring and research - Since winter 1994-1995, WWF, SEMARNAT and CONANP/MBBR staff monitor overwintering populations and forest cover. The Monarch population is estimated by the total area they occupy in the overwintering grounds. There is also an automated system for climate data collection in the MBBR, in connection with the national meteorological institute. Five biological monitoring programs are being carried out. A national network of 17000 volunteers in 23 States helps to monitor the migration routes on the entire Mexican territory.

Compensation scheme and equitable benefit-sharing - Agrarian communities own the majority of land within the biosphere reserve (75%) and land tenure is particularly complex, with more than 100 landowners within the boundaries of the reserve (see graph below).

Map 3. Land tenure within the MBBR



Legend (map): ■ Ejidos ■ Indigenous communities ■ State or federal land □ Private property
Source: Presentation by Mrs. Isabel Ramírez during the mission

With the creation of the MBBR, logging has been banned in the core zones, depriving communities of a significant source of income, so compensation schemes for non-use of forests have been established. Alternative livelihoods projects and Payment for Ecosystem Services schemes for local communities are thus key incentives to enhance local communities support for the conservation of the property.

Only few communities benefit from tourism related to Monarch butterflies. The 2011 reactive monitoring mission to the property recommended to “develop a clear and transparent benefit-sharing mechanism in which it is clear how all communities located within both the core and buffer areas of the reserve are compensated for their efforts to conserve the site, and that any tourism revenue is shared more equitably.”

A Programme of Payment for Ecosystem Services (PROCOCODES) has been set up to prevent illegal logging and degradation of the forests by providing compensation for the loss of opportunity to profit from forest resources. The Monarch Fund has implemented a landowner compensation scheme for the core zone of the property that had active timber harvesting permits. Private donors (WWF-Telcel, Yves Rocher) also support sustainable projects, tree nurseries for reforestation and surveillance activities, that create jobs and sources of income for local communities who participate in these activities.

While positive results of such programmes can clearly be seen, during the mission, some local communities’ representatives also expressed their disappointment, expecting the Government to follow-up on promises of developing further opportunities for alternative livelihoods and sustain financial efforts to payments for environmental services.

Nature and extent of threats to the property

Monarch butterfly's overwintering habitat faces multiple stressors that, together with other factors negatively affecting the Monarch butterflies along their migration route, have contributed to the dramatic decline in Monarch population size (the decline of overwintering colonies is discussed in the next chapter on the state of conservation of the property). Main local threats within the overwintering areas are the degradation of habitat through illegal logging, fires, agricultural and urban encroachment associated with human population growth. In the recent years, there has been a strong and effective response by the State Party to address these threats, however, continued actions will be required. On the other hand, the property is also threatened by growing factors beyond the control of site management, which influence dramatically the migration phenomenon: loss of breeding habitat (milkweed host plants) in the USA and extreme weather events associated with climate change.

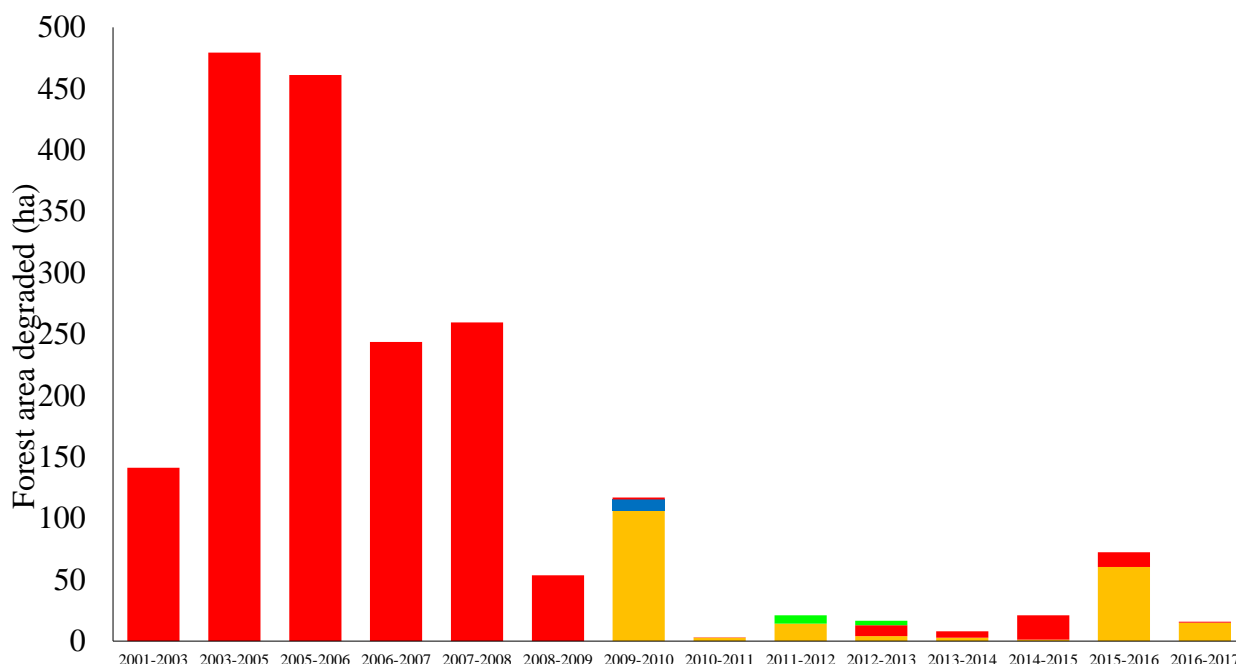
Illegal logging

At the time of its inscription in 2008, illegal logging was identified as the main direct threat to the MBBR. IUCN's evaluation report at the time mentioned that "from 1971 to 2005, almost 4,000 ha of forest have been degraded (logged or disturbed) in the Biosphere Reserve" (IUCN, 2008), with a peak of more than 450 ha lost during the 2003-2004 season. This alarming trend of loss and degradation of forests has severely impacted habitat of butterfly colonies with most of the forests (88%) affected by large and small-scale logging located in the Michoacán State, primarily in colonies Crescencio Morales, El Rosario and Nicolás Romero.

This issue has received a strong response from the State Party, in particular since 2007, and included implementation of a set of actions: a) institutional coordination in the field of law enforcement (Federal agencies, States of México and Michoacán, civil society organizations), b) compensation policy to local communities through the Monarch Fund and WWF, which helped to create alternative income generation and employment, c) permanent presence of the Gendarmerie since 2016 and creation of local vigilance committees, to prevent and detect illegal logging.

This strategy has resulted in curbing large-scale illegal logging: areas affected by new illegal logging activities have decreased to 0,65 ha in 2016-2017, 94% lower than in the previous season (11 ha in 2015-2016). Such a significant decrease is a good indicator of the effectiveness of the measures. However, the situation remains vulnerable and requires constant surveillance. As seen on the graph below, an overall decrease in illegal logging could be observed since 2008, however, in 2015 a relatively large area was illegally logged again within the property by an armed group. On the other hand, it can also be seen that recent years (2015-2017) were also marked by degradation of forest areas due to natural causes, particularly strong storms (2016) and droughts.

Figure 2. Forest area degraded each year due to different factors



Legend: ■ illegal logging ■ natural causes, ■ fires

Source: Presentation by Mr. Cesar O. Avalos Terro, WWF, based on results of forest monitoring studies

Forest restoration actions have been undertaken in some previously affected areas. Over the last 8 years, a total of 722 ha of forest have been restored in the core zone and 9129 ha in the buffer zone, with the support of the Monarch Fund. This is still insufficient compared to the total area degraded but site managers now have science-based practices to deploy, thanks to research on different reforestation practices.

Recommendation 1

Ensure that inter-institutional efforts to detect and prevent illegal logging activities within the property are sustained in the longer-term by providing sufficient resources to the agencies involved, including CONANP, PROFEPA and Environmental Gendarmerie, and by continuing the successful incentives programmes for the local communities, such as creation of local surveillance and patrolling groups.

Recommendation 2

Continue reforestation activities and expand them to all areas within the property that have been impacted by illegal logging activities and ensure that they continue to be supported by research programmes on the most appropriate reforestation methods and approaches.

Conversion of forests to agricultural land

Deforestation caused by the expansion of avocado plantations is a growing concern. Michoacán is the world top producer of avocados. From 2000 to 2010, production

tripled while loss of forest area was estimated at about 690 ha yearly. Until very recently, clearing of forests for avocado plantations had occurred outside the MBBR, but in 2018, Mexican authorities found about 3 ha of illegal avocado plantations inside the reserve.

This new growing threat will require additional surveillance activities and continued cooperation between CONANP, PROFEPA and Environmental Gendarmerie.

Recommendation 3

Develop and implement additional surveillance programmes, as required, to address some of the emerging threats in the broader region, particularly deforestation due to illegal avocado plantations, in order to prevent them from impacting on the property.

Fires

In 2006, 73 fires were detected within the Monarch Butterfly Biosphere Reserve, which burned 186 ha (IUCN, 2008). The last recorded fires in the MBBR occurred in 2009-2010. A working group and two community brigades have been established in the States of México and Michoacán. Recently an Integrated Fire Management Plan has been developed for the MBBR with support from the Research Institute on Ecosystems and Sustainability. An effective cooperation has been established with the National Forestry Commission (CONAFOR) which has specialized forest firefighter brigades.

Tourism

Recreational use of overwintering sites started in 1986 with the opening of the first Monarch Butterfly Sanctuary El Rosario. Although this activity is relatively recent, the number of tourists visiting the colonies has increased dramatically: in the last 30 years, the six sanctuaries opened for visitors have been visited by more than 2,6 million tourists, with an average of 120,000 in recent years.

Table 1. Tourists total number in the MBBR (1986-2016)

El Rosario	Cerro Prieto	Senguio	El Capulín	Macheros	La Mesa	Total
2 004 587	590 620	10 731	27 405	5 334	8 211	2 646 888

The 2011 State of Conservation report noted that “high tourist numbers and poorly regulated visitation could potentially pose a threat to the butterflies by causing the degradation of their overwintering environment”³. Indirect impacts of visitation on forest ecosystem are well known, such as soil compaction, erosion and depletion of water supplies (IUCN, 2008). But the observation of butterflies may also directly impact/affect Monarchs through disturbance. Visitors approaching too close to the colonies can break clusters, dispersing colonies which are forced to relocate to nearby areas, and spend uselessly their energy reserves. A code of conduct has been developed, which includes prohibition of pets and behavioural rules, for example visitors can only stay

³ <http://whc.unesco.org/en/soc/376>

18 minutes in the colony area respecting an appropriate distance. During the visit of El Rosario, the mission found that regulations are clearly shown along trails, and that tourists generally comply with the rules.

CONANP undertook a study of Limits of acceptable change for the MBBR to regulate tourism activities. It also worked with local communities to enhance tourism infrastructure. Between 1990 and 2010, significant improvements have been made in the six sanctuaries open to the public (SECTUR/CONANP) and between 2011 and 2017, with the support of PROCODES, various actions were carried out to strengthen tourism development, such as the construction and maintenance of infrastructure, equipment for the provision of tourist services and training. The mission could visit interpretation centres in El Rosario and Sierra Chincua. This second site, which has two colonies, received 49,000 visitors last year while 40,000 were registered until February 2018, anticipating a total of 60,000 for the entire 2017-2018 season. Admission costs 45 pesos for adults, 40 pesos for children over 6 years old, and a horse ride is 100 pesos.

A national monitoring network informs in real-time on the arrival of butterflies, helping CONANP to define the opening dates, in consultation with local communities and more than 6000 voluntary observers (citizen science). Permits for opening sanctuaries are delivered to tourism operators after the third week of November, when the first groups of butterflies are established. There is pressure from local tourism providers to open sanctuaries earlier in November, however, compliance with the opening dates is being strictly monitored by PROFEPA and sanctions apply in case of non-compliance.

Tourism is a key activity generating income and a way to enhance local support to conservation. During the meeting with advisory council representatives of the MBBR, participants expressed concerns for its decline over the last 5 years due to security concerns. In addition, butterfly observation tourism, being limited to a specific and short season, doesn't generate sufficient incomes to sustain livelihoods of local communities. Therefore, there is a need to develop alternative income generating activities during the off season (March-December) and to diversify tourist services.

Recommendation 4

Continue programmes supporting involvement of local and indigenous communities in conservation activities and compensating them for not using forest resources, including through payments for environmental services.

Recommendation 5

Develop additional ways of providing alternative income for local and indigenous communities, for example by promoting and diversifying sustainable tourism activities, including during the off-season, that could compliment Monarch butterfly observation and are more equally spread among all communities.

Recommendation 6

Develop and officially register a common Monarch butterfly trademark that could be used to promote local sustainable products developed by local and indigenous communities.

Mining

In its decision 39 COM 7B.31 (2017), the World Heritage Committee requested the State Party to “ensure rigorously that any mining in the vicinity of the property will not be permitted if it has the potential to negatively impact the Outstanding Universal Value (OUV)”. Furthermore, this reactive monitoring mission was asked to evaluate the potential threat posed to the OUV of the property by the proposed mining project in Angangueo.

The project in question has been in discussion for several years. In 2005 the company Sociedad Industrial Minera México S.A. de C.V presented an Environmental Impact Statement for a mining project (Proyecto Angangueo) in the buffer zone of the MBBR. The EIA was approved in 2007 by the General Directorate of Environmental Impact and Risk (DGIRA) on conditions that the project would need to receive authorization for land use change in the buffer zone of the MBBR.

In 2013/2014, the mining company submitted a request to SEMARNAT for land use change (6,96 ha) in a forest area. The technical evaluation by CONANP concluded that this project was incompatible with conservation objectives of the MBBR and SEMARNAT did not authorize the land use change.

The Advisory Council of the MBBR established a special group to assess the current project proposal and held consultations with experts and representatives of local communities in 2014. In its report on the issue, it is noted that the EIA that was developed by the mining company back in 2005 did not include some important elements, such as assessment of risks for the local population nor proposed mitigation measures. An evaluation of potential impacts on the hydrological regime of the area was also missing. In this regard, concerns were also expressed by some experts that the mining activities would involve extraction of large volumes of water from the subsoil due to the fact that the mineral deposits to be extracted are located below the groundwater table (Memoria del Foro de Información - Minería en la Reserva de Biosfera, 2014).

The mission discussed the issue at length during a meeting with representatives of local communities and experts who were involved in the consultation process. While some representatives of local communities expressed their support for the project as they see it as bringing new jobs to the area, many are also concerned about potentially significant risks to the environment and human health.

The project was also discussed by the mission with representatives of CONANP who have reiterated that any mining project within the reserve will not be authorized by them, and *de facto*, since 2014, no authorization has been granted. However, the situation remains vulnerable considering that 32 mining concessions with a total of 26,105 ha overlap partially or completely with the MBBR (Memoria del Foro de Información, 2014) and a new request for the abovementioned or any other project could be submitted. Plans for reopening of the Angangueo mine continue to be discussed, despite the conclusions of CONANP.

The mission also noted that mining appears not to be fully prohibited within the biosphere reserve in the reserve's Management Programme (2001), even though the programme outlines actions aimed at regulating potential mining activities within the reserve. It is recommended that a revision of this approach and development of more detailed regulations are included in the eventual revision of the Management Programme. This process should include definition of the World Heritage property as a no-go area for any mineral exploration or extraction and strict regulations for any mining activities outside the boundaries of the property in order to avoid any negative impact on its OUV, including its conditions of integrity.

Recommendation 7

Ensure that no mining activities are permitted within the property by clearly defining the property as a no-go area for any mineral exploration and extraction and by developing strict regulations for any mining activities within the buffer zone of the MBBR in order to avoid any negative impacts on the property's OUV, including its conditions of integrity, through revision of the Management Programme of the MBBR or other relevant legislative instruments, in collaboration with all relevant agencies and authorities.

Recommendation 8

Update the register of mining concessions overlapping the MBBR and any other areas outside it that may be occupied by overwintering colonies.

Loss of breeding habitat (milkweed host plants)

Among potential causes of decline of the Monarch population since the late 1990s, the loss of breeding habitat in the Midwestern agricultural lands of the United States of America has been identified as an important driver.

Approximately half of the Mexican overwintering population of Monarch butterflies come from the U.S. Midwest. Consequently, the size of overwintering populations in Mexico is positively correlated to the Monarch production in the Midwest in spring each year. In this region, host plants for caterpillars – milkweeds (*Asclepias spp.*) - and nectar plants of other species that provide food for adults, are both critical to the survival of Monarch butterflies.

However, there has been a significant reduction of common milkweed in agricultural fields in the corn belt region of the USA over the last decade. This decline coincides with increased use of glyphosate herbicide on genetically modified herbicide-resistant corn and soybean crops (Brower and al., 2012). Pleasants and Oberhauser (2012) showed a correlation between decreased wintering populations density of Monarch butterfly and loss of milkweed in the USA. They estimate a 58% decline in milkweeds and an 81% decline in Monarch production in the Midwest landscape from 1999 to 2010 and conclude that the loss of milkweeds is a major contributor to the decline in the Monarch population. Some scientists (Flockhart et al. 2014, Jepsen et al. 2015) even suggest that milkweed loss in the Midwest of the USA has more influence than climate change and deforestation in Mexico on projected population declines of monarchs.

Trinational cooperation between the States Parties of Canada, Mexico and the United States of America is therefore of crucial importance for the long-term preservation of the migratory phenomenon of the Monarch butterfly. While significant efforts have already been achieved in establishing such cooperation and developing joint programmes, attention should also be paid to developing specific actions in each country that address threats posed to the Monarch butterfly at different stages of its lifecycle. In the USA, minimizing the loss of areas covered by native milkweed species and wherever possible restoring them through appropriate measures will be of particularly high importance.

Recommendation 9

Continue and, where necessary, strengthen trinational cooperation in the field of Monarch butterfly conservation, including within the framework of the North American Monarch Conservation Plan, and accelerate actions aimed at minimizing threats to the Monarch butterfly along its migration route, paying particular attention to the measures required to minimize the loss and to restore the range of native milkweed species in the United States of America.

Climate change and extreme weather events

Extreme weather events are becoming more frequent and intense, affecting Monarch butterfly throughout its range. In Central Mexico, increased cool-weather precipitation could cause mass mortality, as Monarchs are very sensitive to temperature during their overwintering period.

Atypical events are expected to become a major threat for Monarch butterfly in the next few decades. Snow and freezing temperature, severe rain and storms have already caused several mass mortality episodes. In January 1981, a storm associated with freezing killed an estimated 2.5 million butterflies in the Sierra Chincua (Calvert et al., 1983) and in 1992, an episode of extreme cold weather killed 83% of a small colony in San Mateo Almomoloa / Herrada (Culotta, 1992). Other storms and extreme cold temperature occurred in January 2002 and 2004, while in February 2010, an unprecedented storm with catastrophic rainfalls, caused damages by floods and landslides. In March 2016, probably millions of butterflies died due to rains, snow falls and strong winds. The severe storm associated with snowfall that occurred on 9-11 March 2016 affected 24,047 trees within the MBBR (52% of them located in the core zone and 48% in the buffer zone).

The mission could observe landslide areas within the MBBR caused by this storm. (photo 3). In mid-September 2017, two tropical storms and three hurricanes hit the Atlantic coast, and may have affected the migration of the wintering populations.

Photo 3. Impact of the 2016 storm in the MBBR



In the long term, phenological changes are also anticipated. High temperatures may affect the pattern of migration by promoting early departure from the overwintering areas. Climate change could also impact the distribution of plant species important for the Monarch butterfly. Due to its superficial root system, the Oyamel fir (*Abies religiosa*) is particularly vulnerable and some studies note potential significant changes in the distribution of the Oyamel fir due to changing climatic conditions and therefore potentially a dramatic decrease of suitable habitat for overwintering colonies within the MBBR (Sáenz-Romero et al., 2012).

Recommendation 10

Develop an adaptive management approach for the Monarch Butterfly Biosphere Reserve, based on robust monitoring data, which identifies options for climate change adaptation, including for the plant species important for the Monarch butterfly, particularly the Oyamel fir.

Conclusions on threats

Overall it can be concluded that the main threats affecting the property at site-level (the overwintering areas) include illegal logging and more recently also conversion of forest areas to illegal avocado plantations. While the threat of illegal logging within the MBBR could be reduced significantly in the last ten years thanks to effective collaboration between CONANP, PROFEPA and the recently established Environmental Gendarmerie, as well as involvement of local communities in surveillance through establishment of local patrolling groups, these efforts will need to be sustained. New emerging threats, such as illegal avocado plantations, will require additional enforcement efforts.

Among significant potential threats, mining remains the most serious one, even though at the moment it appears that the strong position of CONANP not to authorize the land use change in the buffer zone of the MBBR required for the proposed Anganguero mining project should guarantee that it will not proceed. However, risks remain that this or another mining projects may be put forward again in the future.

On the other hand, as discussed above, the migratory phenomenon of the Monarch butterfly is also affected by factors far beyond the boundaries of the property. A number of theories have been developed in recent years which link the decline of the Monarch population with different factors potentially affecting the species during various life cycle stages and along the migration route. While many suggest that the decline in milkweed, the only host plant for the Monarch butterfly caterpillars, due to increased use of genetically modified more herbicide-resistant crops in the USA has contributed significantly to the Monarch butterfly decline (Brower et al., 2012, Pleasants and Oberhauser, 2012), others highlight that other stages in the lifecycle of the butterflies are equally critical (Inamine et al., 2016). Therefore, conservation efforts are required alongside the entire migration route and addressing different lifecycle stages in order to preserve the outstanding phenomenon of Monarch butterfly migration.

ASSESSMENT OF THE STATE OF CONSERVATION OF THE PROPERTY

Forest cover and annual wintering populations of Monarch butterflies are monitored annually by CONANP, WWF and other experts. This monitoring provides an approximation of the state of conservation of the main value of the property. The mission was provided with the results of this monitoring which are discussed below and the results are also regularly published in scientific articles.

Butterfly occupation (ha) / space occupied by colonies

At national level, butterflies use 46 protected areas including 29 federal ones, but the World Heritage property protects 70% of the overwintering population of the Monarch butterflies in Mexico.

Since early 1993, Monarch populations within the MBBR are estimated by the number of hectares of trees occupied by clusters of overwintering butterfly colonies. Occupied trees are mapped and the total area of the colonies gives an approximation of the yearly Monarch abundance. The monitoring includes bi-weekly measurements from November to March, and the peak measurement in the second half of December, when butterflies are perched on tree trunks, indicating that colonies are well established (form stable aggregations).

Photos 4-5. Monitoring of Monarch butterfly



Figure 3. Change in the area occupied by overwintering colonies (ha) for winter seasons 1993-1994 to 2017-2018 (Source: data provided to the mission, also yearly published by WWF Mexico and CONANP)

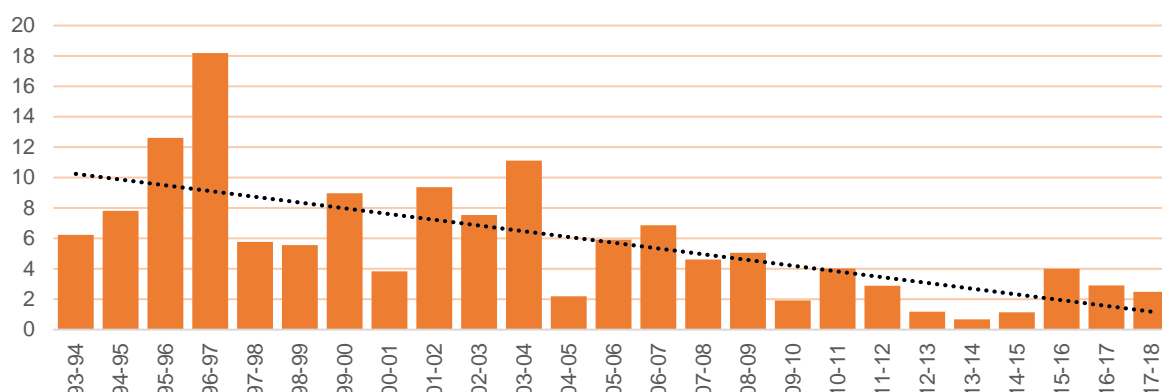


Table 2. Evolution of butterfly occupation (ha)

Season	Area (ha)
2010-2011	4,02
2011-2012	2,89
2012-2013	1,19
2013-2014	0,67
2014-2015	1,13
2015-2016	4,01
2016-2017	2,91
2017-2018	2,48

This annual monitoring reveals a significant decline in the wintering population of more than 80% since the late 1990s (it should be noted that the monitoring programme only covers the “historical” colonies and therefore some colonies located outside the MBBR have not been regularly monitored). In 2014, Vidal and al. estimated that the total cumulative area of forest used by Monarch butterflies in the 19 overwintering colonies during the last decades was 106.53 ha, of which 83.68% were located inside the MBBR. Between 1994 and 2010, the butterflies used each year an average area of 7.44 ha (Rendón-Salinas et al., 2010), but there is a large seasonal and spatial fluctuation. After an extremely low figure in 2013-2014 (0,67 ha), the spatial coverage of the

Monarch butterfly population increased to 4,01 ha in 2015-2016. Notwithstanding this recorded increase, the area covered remains 32% below the 22-years average and significantly lower than the historical peak (the largest population size ever recorded was 18,19 ha in 1996-1997). It decreased again during the 2016-2017 season, when the colonies of the Monarch butterfly occupied 2,91 ha. In 2017-2018, 9 colonies of Monarch butterfly were registered, of which 3 in the State of Michoacán and 6 in the State of México, with a total occupation area of 2,48 ha. This represents a 14.77% decrease compared to the previous season. The biggest colony was in the ejido San Antonio Albarranes (Santuario de Palomas, State of Mexico) while the smallest ones (0.04 ha) were in La Mesa and San Francisco Oxtotilpan.

Overall, it can be seen that while the area occupied by the overwintering colonies has increased in the recent years compared to the lowest figure of only 0,67 ha during the 2013-2014 season, the situation remains vulnerable and the longer-term trend remains a decreasing one.

A study undertaken in 2016 by the U.S. Geological Survey concluded that there is an 11% to 57% risk that the eastern monarch migration could collapse within the next 20

years (Semmens, B. X. et al., 2016). They further concluded that a five-fold increase of the population size compared to the one during 2014-2015 season would be required to halve the risk of such a quasi-extinction.

The fact that Monarch butterflies have been declining yearly despite illegal logging decrease and less forest degradation suggests other mortality factors, primarily climate change and loss of breeding habitat, as described above, but also insecticides, invasive species, competition for nectar, impacts with vehicles. Overwintering populations also depend on how many can survive during their migration route in Canada, USA and Mexico. Similarly, a severe decline of the population average has been observed at overwintering sites in California, which face other pressures.

A trilateral objective has been agreed between Canada, Mexico and the USA in 2015 to increase the eastern population of Monarch butterfly to 225 million by 2019. This goal corresponds to 6 ha of butterfly occupation in overwintering areas, a level comparable to 2006-2007. The goal has been defined according to the area of milkweed plants that could be restored.

Within the MBBR, the three most important overwintering massifs for Monarch butterflies since their discovery in 1975 are El Rosario, Sierra Chincua, and Cerro Pelón, the largest colony recorded being El Rosario (around 2,5 ha). During the mission, the existence of other colonies of equal size/importance outside the MBBR has been discussed, justifying a consideration of possible future extension of the property.

The Adapting to Climate Change Program of the Monarch Butterfly Complex, financially supported by GEF and UNDP, could be a framework to consider such options, by enhancing connectivity between 5 federal protected areas which share forests ecosystems of Oyamel and host around 10 overwintering sites (MBBR, Valle de Bravo Natural Resources Protection Area, Nevado de Toluca Flora and Fauna Protection Area, Izta-Popo National Park and La Malinche National Park).

Recommendation 11

Develop and expedite a proposal for an extension of the property to include all areas occupied by overwintering colonies of Monarch Butterfly currently located outside the property (such as those within Valle de Bravo Natural Resources Protection Area, Nevado de Toluca Flora and Fauna Protection Area, Izta-Popo National Park and La Malinche National Park), in order to increase the potential of the property to adapt to changing climatic conditions and associated changes in the distribution of overwintering colonies.

Changes in forest cover

Oyamel fir and pine trees forests in the Mexico region offer suitable microclimate conditions for overwintering: fresh water, dappled sunlight, high humidity, absence of freezing temperatures and high wind. The majority of overwintering sites are located within the MBBR, and threats to their integrity, including particularly illegal logging, have been discussed by the World Heritage Committee since the inscription of the property. But over the last decade, factors have clearly changed. Before 2007,

important forest loss was mostly due to illegal logging. Forests most affected were those in colonies Crescencio Morales, El Rosario, Nicolás Romero, La Mesa, Cerro Prieto, and San Juan Xoconusco. In 2014-2015, 96% (19.13 ha) of area deforested by illegal logging was concentrated in the community San Felipe de los Alzati.

Since 2007, as previously indicated, degraded forest areas within MBBR have significantly decreased, and illegal logging dropped to 0.65ha, due to serious efforts undertaken to address this threat, notably the permanent presence of the recently established Environmental Gendarmerie. Other anthropogenic pressures like fire are no longer causes of deforestation, with the exception of the 2009-2010 season. Illegal logging is now surpassed by extreme weather events, in particular tree falls related to strong winds and drought events, which became the major factor in forest degradation: 60.38 ha of forest in the Monarch reserve have been affected in 2015-2016 and 15.15 ha in 2016-2017.

Figure 4. Forest loss/degradation factors from 2010 to 2017 (main factors)

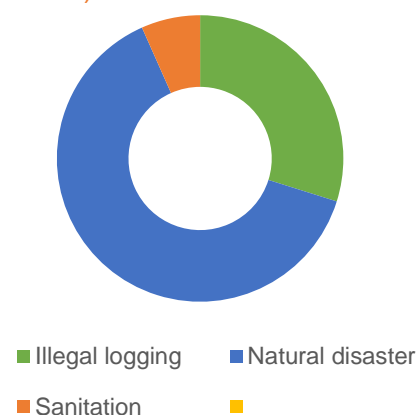
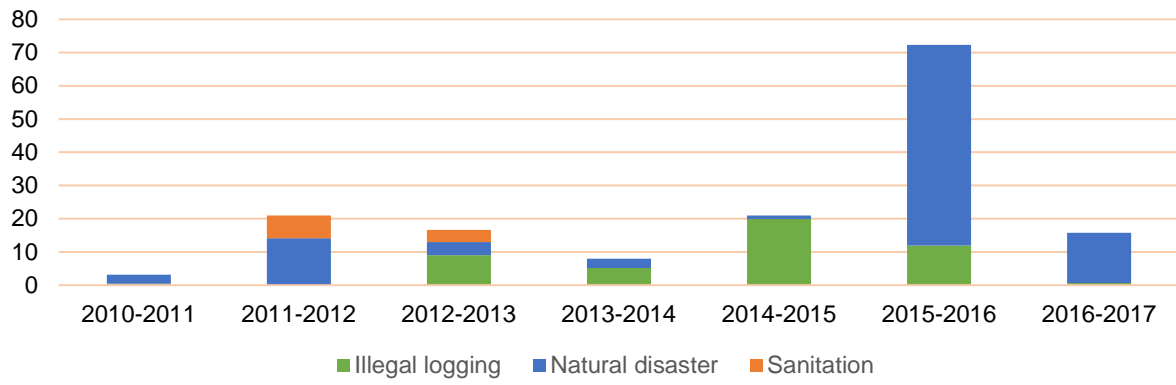


Table 3. Area deforested and reforested (2010-2017)

Season	Area reforested (ha)	Area deforested (ha)	Area deforested by factor			
			Illegal logging	Natural disaster	Fire	Sanitation
2010-2011	*	3.16	0.48	2.68	0	0
2011-2012	*	20.95	0	14.14	0	6.81
2012-2013	*	16.62	8.98	3.95	0	3.69
2013-2014	*	7.99	5.18	2.81	0	0
2014-2015	*	21.01	19.90	1.11	0	0
2015-2016	*	72.30	11.92	60.38	0	0
2016-2017	100	15.80	0.65	15.15	0	0
Total 2010-2017	722	157.83	47.11	100.22	0	10.5

* Information missing

Figure 5. Change in forest cover



CONCLUSIONS AND RECOMMENDATIONS

In accordance with Decision 41 COM 7B.16, adopted by the World Heritage Committee at its 41th session, the State Party of Mexico invited an IUCN reactive monitoring mission to the Monarch Butterfly Biosphere Reserve from 29 January to 3 February 2018. The purpose of the mission was to evaluate current and potential threats posed to the property's OUV by illegal logging and the proposed mining project, and to assess its overall state of conservation and the protection of the Monarch butterfly overwintering areas located both within the property and in its vicinity.

Overall, the mission could observe that significant progress has been achieved in recent years in addressing the threats facing the property. The State Party should be commended for consolidating efforts in the field of prevention and detection of illegal activities, particularly illegal logging, thanks to efficient collaboration between different institutions (CONANP, PROFEPA and recently Environmental Gendarmerie), as well as involvement of local communities. Since 2008 incidences of illegal logging within the property have decreased significantly. However, the property remains vulnerable as cases of illegal logging still occur and therefore efforts to combat it will need to be sustained in the longer-term. The State Party should therefore be encouraged to continue its coordinated efforts to ensure zero illegal logging in the property (core zones of the Monarch Butterfly Biosphere Reserve) through both coercive and incentives actions. Reforestation activities should be extended to all areas degraded by illegal logging in the past and accompanying research activities on most appropriate reforestation methods and approaches should be supported in the longer-term. It will also be important to protect the buffer zone of the property from any unsustainable forest exploitation. Special attention should also be given to new emerging threats such as illegal land conversion for avocado cultivation. Therefore, the mission makes the following recommendations:

1. Ensure that inter-institutional efforts to detect and prevent illegal logging activities within the property are sustained in the longer-term by providing sufficient resources to the agencies involved, including CONANP, PROFEPA and Environmental Gendarmerie, and by continuing the successful incentives programmes for the local communities, such as creation of local surveillance and patrolling groups.
2. Continue reforestation activities and expand them to all areas within the property that have been impacted by illegal logging activities and ensure that they continue to be supported by research programmes on most appropriate reforestation methods and approaches.
3. Develop and implement additional surveillance programmes, as required, to address some of the emerging threats in the broader region, particularly deforestation due to illegal avocado plantations, in order to prevent them from impacting on the property.

On the other hand, these efforts also need to continue to be supported by actions aimed at providing alternative income generation solutions to local and indigenous communities on whose territory the property is located. Payments for environmental services to local communities located within both the property and the buffer areas of

the reserve are key incentives to support their efforts to conserve the site. It is necessary to ensure that these programmes will be sustained. However, it will also be important to ensure that other means of securing alternative incomes are available. For example, few communities currently benefit from tourism related to Monarch butterfly and visitation is increasing dramatically in the six sanctuaries open to the public. In order to generate incomes that are more equitably shared, it will be important to develop other forms of sustainable tourism, not only focused on butterfly observation, including during the off-season. One way to provide more economic benefits for local communities could be the promotion of an officially recognized Monarch trademark for local products.

4. Continue programmes supporting involvement of local and indigenous communities in conservation activities and compensating them for not using forest resources, including through payments for environmental services.
5. Develop additional ways of providing alternative income for local and indigenous communities, for example by promoting and diversifying sustainable tourism activities, including during the off-season, that could compliment Monarch butterfly observation and are more equally spread among all communities.
6. Develop and officially register a common Monarch butterfly trademark that could be used to promote local sustainable products developed by local and indigenous communities.

Other significant threats include mining activities. While currently it remains a potential threat and while the mission was assured that CONANP remained opposed to the proposed Anganguero mining project in the vicinity of the property and in the buffer zone of the MBBR, the mission concluded that a more systematic approach to regulating potential mining activities was required. Based on these findings, the mission recommends the following:

7. Ensure that no mining activities are permitted within the property by clearly defining the property as a no-go area for any mineral exploration and extraction and by developing strict regulations for any mining activities within the buffer zone of the MBBR in order to avoid any negative impacts on the property's OUV, including its conditions of integrity, through revision of the Management Programme of the MBBR or other relevant legislative instruments, in collaboration with all relevant agencies and authorities.
8. Update the register of mining concessions overlapping the MBBR and any other areas outside it that may be occupied by overwintering colonies.

The mission observed that other threats have emerged more prominently since the inscription of the property. This is particularly true for those factors which negatively affect the Monarch butterflies along the entire migration route, including climate change and associated extreme weather events and the loss of milkweed plants, on which Monarch butterflies depend as their breeding habitat, in the United States of America. A number of studies suggest that the decline in milkweed, the only host plant for the Monarch butterfly caterpillars, in the USA due to increased use of genetically modified more herbicide-resistant crops has contributed significantly to the Monarch butterfly decline. However, others highlight that other stages in the lifecycle of the butterflies are equally critical. Therefore, conservation efforts are required alongside the entire migration route and addressing different lifecycle stages in order to preserve the outstanding phenomenon of Monarch butterfly migration.

Addressing many of these external and global threats exceed the capacity of actors involved in the management of the property. It is therefore recommended to fully support the conservation of the Monarch butterfly and its habitat restoration along its entire migratory route by implementing action plans across Canada, the USA and Mexico. Tri-national and inter-sectoral cooperation should be enhanced to protect habitat in all three countries, to maintain corridors and minimize any anthropogenic threats to populations. In this regard, the mission makes the following recommendation to the States Parties of Canada, Mexico and the United States of America:

9. Continue and, where necessary, strengthen trinational cooperation in the field of Monarch butterfly conservation, including within the framework of the North American Monarch Conservation Plan, and accelerate actions aimed at minimizing threats to the Monarch butterfly along its migration route, paying particular attention to the measures required to minimize the loss and to restore the range of native milkweed species in the United States of America.

Finally, while discussing measures required for climate change mitigation lies beyond the scope of this mission, the mission considers that certain measures can be undertaken at the local scale in order to ensure that all overwintering areas, both historic ones and those which are becoming more used by the butterflies, have the appropriate level of protection in order to ensure that there is certain potential for adapting to changing climatic conditions and that an adaptive management approach is applied in order to ensure that Oyamel fir areas remain preserved within the property and beyond in the longer term. Furthermore, as restoring degraded forests requires decades, it is important that all areas suitable for the Monarch butterfly overwintering are protected in the short term. In this regard, the mission makes the following recommendations:

10. Develop an adaptive management approach for the Monarch Butterfly Biosphere Reserve, based on robust monitoring data, which identifies options for climate change adaptation, including for the plant species important for the Monarch butterfly, particularly the Oyamel fir.
11. Develop and expedite a proposal for an extension of the property to include all areas occupied by overwintering colonies of Monarch Butterfly, currently located outside the property (such as those within Valle de Bravo Natural Resources Protection Area, Nevado de Toluca Flora and Fauna Protection Area, Izta-Popo National Park and La Malinche National Park), in order to increase the potential of the property to adapt to changing climatic conditions and associated changes in the distribution of overwintering colonies.

ANNEXES

Annex 1. Terms of reference of the mission

Annex 2. WHC Decisions

Annex 3. Itinerary and programme

Annex 4. Composition of mission team

Annex 5. List of people met

Annex 6. Maps

Annex 7. Photographs and other graphical material

Annex 8. Bibliography

Annex 1. Terms of reference of the mission

The objective of the monitoring mission is to “evaluate current and potential threats posed to the property’s OUV by illegal logging and the proposed mining project, and to assess its overall state of conservation and the protection of the Monarch butterfly overwintering areas located both within the property and in its vicinity”.

In particular, the mission had to assess:

1. current and potential threats posed to the property’s OUV and integrity by illegal logging and the measures undertaken by the State Party to combat illegal logging;
2. current situation with the proposal to reopen a copper mine in the vicinity of the property and potential threats of such reopening to the property’s OUV and integrity;
3. the overall state of conservation of the Monarch butterfly overwintering areas located both within the property and in its vicinity;
4. any other relevant issues that may negatively impact on the OUV of the property, including its conditions of integrity and protection and management, in line with paragraph 173 of the Operational Guidelines.

Annex 2. WHC Decisions

Decision: 41 COM 7B.16

The World Heritage Committee,

1. Having examined Document WHC/17/41.COM/7B,
2. Recalling Decision **39 COM 7B.31**, adopted at its 39th session (Bonn, 2015),
3. Welcomes the trinational efforts undertaken by the States Parties of Canada, Mexico and the United States of America to preserve the Monarch butterfly migration, including establishment of the Trinational Working Group and encourages them to continue their efforts;
4. Also welcomes the significant measures undertaken by the State Party to combat illegal logging and to restore the previously affected areas, but notes with concern that the property remains vulnerable to this threat and requests the State Party to strengthen its efforts in this regard;
5. Notes with utmost concern that plans for reopening a copper mine in the vicinity of the property continue to be discussed, despite the conclusion of the National Commission for the Protection of Natural Areas (Comisión Nacional de Áreas Naturales Protegidas - CONANP) that the project would be incompatible with the conservation objectives of the Monarch Butterfly Biosphere Reserve, and also requests the State Party to ensure rigorously that any mining in the vicinity of the property will not be permitted if it has the potential to negatively impact the Outstanding Universal Value (OUV) of the property;
6. Further requests the State Party to invite an IUCN Reactive Monitoring mission to the property to evaluate current and potential threats posed to its OUV by illegal logging and the proposed mining project, and to assess its overall state of conservation and the protection of the Monarch butterfly overwintering areas located both within the property and in its vicinity;
7. Requests furthermore the State Party to submit to the World Heritage Centre, by **1 December 2018**, an updated report on the state of conservation of the property and the implementation of the above, for examination by the World Heritage Committee at its 43rd session in 2019.

Annex 3. Itinerary and programme

3.1. Field visit



JANUARY 31



FEBRUARY 1



FEBRUARY 2

3.2. Agenda

MONDAY, JANUARY 29, 2018

9:30 AM **☉ Introductory meeting**

MEXICO CITY

Welcome by the National Commissioner
Introduction to the Property and its Exceptional Universal Value
Objectives and Agenda of the Mission
Presentation of the members of the Mission

10:00 AM **☉ Presentations by representatives of the Federal Government institutions and Governments of the States of Mexico and Michoacán**

MEXICO CITY

Actions for the protection of the World Heritage Property Monarch Butterfly Biosphere Reserve.
Action Plan for the Conservation of the Migratory Phenomenon of the Monarch Butterfly
Migratory Route and hibernation areas
Inspection and surveillance

11:30 AM **● Break**

MEXICO CITY

12:00 AM **☉ Meeting with Institutions, Organizations and Foundations**

MEXICO CITY

Presentations about actions and programs
Discussion with the members of the Mission

1:30 PM **● Lunch**

MEXICO CITY

- | | | |
|-------------------|---|-------------|
| 3:30
PM | ● Departure from the CDMX to Zitácuaro, Mich | MEXICO CITY |
| 6:00
PM | ● Transfer to Rancho San Cayetano Hotel and Registration | ZITÁCUARO |

TUESDAY, JANUARY 30, 2018

- | | | |
|--------------------|---|-----------|
| 7:30
AM | ● Breakfast | ZITÁCUARO |
| 8:30
AM | ● Transfer to the offices of the Management of the RB Mariposa Monarca | ZITÁCUARO |
| 9:00
AM | ◎ CONANP-Mission coordination meeting
Monarch Fund, Best Practices Programs, Forestry Coverage and Concurrent Funds.
Tourism infrastructure development and capabilities
Acceptable Change Limit Study
Inspection and surveillance
Attention to Environmental Contingencies (Threats) | ZITÁCUARO |
| 11:00
AM | ● Break | ZITÁCUARO |
| 11:30
AM | ◎ Meeting with the network of Civil Society Organizations | ZITÁCUARO |
| 1:30
PM | ● Lunch | ZITÁCUARO |
| 3:00
PM | ◎ Meeting with experts, and members of the Reserve Advisory Board | ZITÁCUARO |
| 6:00
PM | ● Dinner at the hotel | ZITÁCUARO |

WEDNESDAY, JANUARY 31, 2018

- | | | |
|--------------------|--|----------------|
| 7:30
AM | ● Breakfast | ZITÁCUARO |
| 8:30
AM | ● Transfer to the Sierra Chincua Sanctuary | SIERRA CHINCUA |
| 10:00
AM | ◎ Explanation about the operation of the tourist activity in the tourist resort Sierra Chincua | SIERRA CHINCUA |
| 11:00
AM | ◎ Tour of the tourist trail to get to know the hibernation colonies of the Sierra Chincua Sanctuary | SIERRA CHINCUA |
| 1:00
PM | ● Return to the tourist hostel | SIERRA CHINCUA |
| 2:00
PM | ● Lunch | SIERRA CHINCUA |

3:00 PM	☉	Tour of the Gabion Dam Zone. Attention to contingencies and mining	...
5:00 PM	☉	Visit the restaurant area. Inspection and surveillance actions (illegal logging)	...
6:30 PM	●	Return to Zitácuaro, Mich.	ZITÁCUARO
8:00 PM	●	Dinner at the hotel	ZITÁCUARO

THURSDAY, FEBRUARY 1, 2018

7:30 AM	●	Breakfast	ZITÁCUARO
8:30 AM	●	Transfer to the sanctuary El Rosario	EL ROSARIO
9:30 AM	☉	Visit to Monarch butterfly colony and tourist trail Tour of the Tourist Parador	EL ROSARIO
1:00 PM	●	Transfer to the Alternare Training Center	...
2:00 PM	●	Lunch at the Alternare Training Center	...
3:00 PM	☉	Presentation of the PACC	...
3:30 PM	☉	Presentations: Community Participation and Investment Programs	...
5:30 PM	●	Return to Zitácuaro, Mich.	ZITÁCUARO
7:00 PM	●	Dinner at the hotel	ZITÁCUARO

FRIDAY, FEBRUARY 2, 2018

7:30 AM	●	Breakfast and Hotel Check out	ZITÁCUARO
8:30 AM	●	Transfer to El Capulín	EL CAPULÍN
9:30 AM	☉	Meeting with authorities of the Environmental Division of the Gendarmerie	EL CAPULÍN
11:00 AM	●	Transfer to C.I. San Pablo Malacatepec	MALACATEPEC

11:30 AM	☉ Interview with communal authorities and visit of productive projects	ZITÁCUARO
12:30 PM	● Lunch	ZITÁCUARO
1:30 PM	● Return to Mexico City transfer to the airport	MEXICO CITY

Annex 4. Composition of mission team

ELENA OSIPOVA

*Monitoring Officer,
IUCN World Heritage Programme*

IUCN Headquarters
Rue Mauverney 28
1196 Gland, Switzerland
<http://www.iucn.org>

THIERRY LEFEBVRE

Protected areas Programme Officer

IUCN French Committee
IUCN/WCPA member

Annex 5. List of people met

Listed by institutions and in alphabetical order by last name in each group. Possible omissions or mistakes are unintended and entirely the authors' responsibility.

Name	Institution
Alejandro del Mazo Maza	CONANP
Jorge Rickards	Fondo Mundial para la Naturaleza (WWF)
Luz María Ortiz	SEMARNAT
Francisco Flores Jáquez	Comisión Nacional Forestal
Francisco Botello	Instituto de Biología de la UNAM
Eduardo Rendón	Fondo Mundial para la Naturaleza (WWF)
Nuria Sanz Gallegos	UNESCO office in México
José Luis Sánchez Hernández	Secretaría de Relaciones Exteriores
Ana Paola González Alonso	Secretaría de Relaciones Exteriores
Jorge Alberto Tique Sánchez	SEMARNAT
Alfonso de la Torre Vega	SEMARNAT
Francisco Vidargas Acosta	Instituto Nacional de Antropología e Historia
Carlos Enrique Galindo Leal	Comisión Nacional para el Conocimiento y
Claudia Salinas Rodriguez	Uso de la Biodiversidad
Luis Eduardo Gómez García	Comisión Mexicana de Cooperación con la
Anna Sofia Manzur Garcia Maass	UNESCO, SEP
Juan Manuel Frausto Leyva	Secretaria del Medio Ambiente
Fernando Camacho Rico	Secretaria del Medio Ambiente
Gloria Fermina Tavera Alonso	Fondo Mexicano para la Conservación de la Naturaleza
Ignacio March Mifsut	CONANP
María Pia Gallina Tessaro	CONANP
Felipe Martínez Meza	CONANP
Francisco Javier Medina	CONANP
Napoleón Filliat	CONANP
David Gutierrez Carbonell	CONANP
Lucía Ruíz Bustos	CONANP
José Bernal Stoppen	CONANP
Sara A. García Martínez	CONANP
Ariana Flores Rodríguez	CONANP
Liliana Araujo Saucedo	CONANP
Jaquelina Bravo Arteaga	CONANP
Marco Castro Martínez	CONANP
Gina Castillo Picazo	CONANP
Ma. Paz Diaz Hernández	CONANP
C. Alejandro Nieto Benitez	Presidente del consejo
C.J. Carmen Martinez Colin	Ejido S Prieto

Mabiel Malagon Archundia	SEMACCDDET
Rolando Reyes	-
José Luis []	-
Alberto Morales Reyes	PSTF
Pablo R. Span	Turismo
C. Esteban Tobias Garduno Miranda	Ejido Cerritos de C
C. Luis Fernando Luna Torres	Ejido Sengu
C Crescencio Moreno Sanchez	Comisariado ejidal
C. Artemio Rojas Cuevas	Hervido y Plancha
Eugenio Bernal	Carpinteros
Rodolfo Contreras Zamora	Col Nicolas Romero
Marco Antonio Castro	CONANP/DRCEN
Alejandro Garcia Garcia	PROFEPA
Homero Gomez	El Rosario
Rodrigo Alejandro Soto Valdez	El Rosario
Miguel Garcia	El Rosario
Valente Valdes	El Rosario
Jose Alfredo	El Rosario
Inocencio Gonzalez	El Rosario
Jhonatan Valencia Cruz	El Rosario
Ruben Es[-] G	El Rosario
José Martinez Cruz	El Rosario
Ma Carmen Perfecto Garcia	El Rosario
Mauricio Gonzalez	El Rosario
Eduardo Miranda	
Salvador Garcia Ramirez	
Juventino Verrios Domingues	
Jose Luresio Gonzales Mondrogon	
J. Carmen Guzman Gonzales	
Raul Garcia Cruz	
Juan Pablo Sanchez Dominguez	
Roberto Gonzales	
[]Piedad Roselio Gonzalez	
José Gonzalez	
[]alio Gonzalez	
Eriberto Cruz Gonzalez	
Abel Sanchez Posadas	
Ma Del Carmen	
Eva Torres Garcia	
J Santos Gonzalez	
Ma Imelda Gonzalez	
Herminio Gonzalez	
Maria Remedios Garcia Diaz	
Prisila Gonzalez	
Brianda Cristelh Cruz	
Sara Dykman	
Dulce Cruz de Jesus	
M. Guadalupe Martinez	

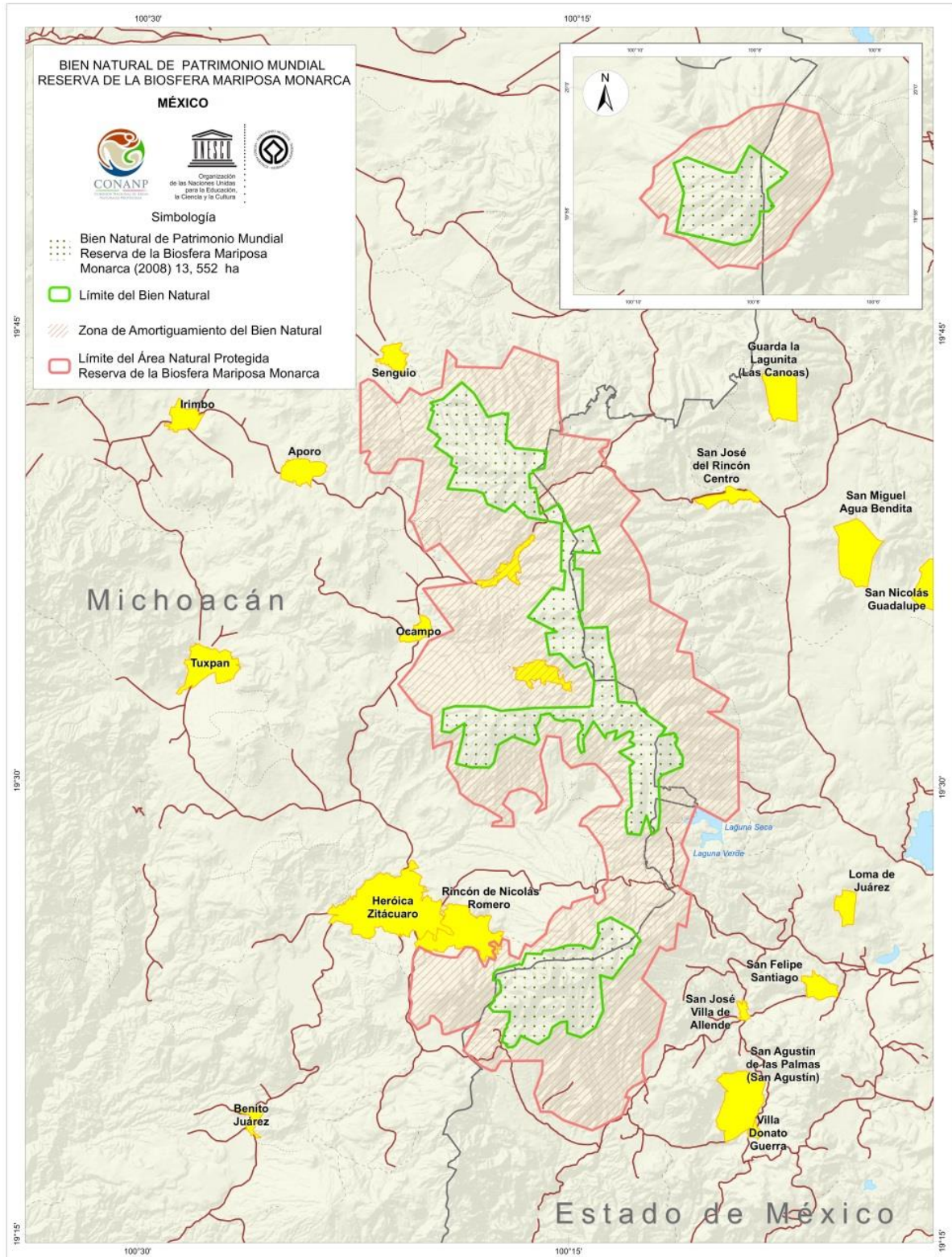
Silvia Ezquivel	
Erika Garduro	
Victor Garcia	CONAFOR
Leonardo Martinez	UNAM
Heriberto Zetina	CONAFOR
Edgar Enrique Garcia	CONAFOR
Silverio Pérez Pérez	CONAFOR
Valentin Calilo Martinez	CONAFOR
Rafael Romero	CONAFOR
Ezequiel Garcia Francisco	CONAFOR
Joc[] Lopez	CONAFOR
Ramiro Guadalupe Venegas Castaneda	CONAFOR
Gabriel Reyes Leon	CONAFOR
Noé Garcia Pérez	CONAFOR
Miriam Camilo Garcia	CONAFOR
Faistino Martinez	CONAFOR
Hiram Sair Lopez Perez	CONAFOR
Nicolas Camilo Segundo	CONAFOR
Alberto Soto Gargas	CONAFOR
Edilberto Lopez Sanchez	CONAFOR
Celia Tol[]	Periodista
Ana Maria Munez Sal[]do	Alternare
José Ricardo	San Pablo Malacatepec
José Cruz Bonifacio	Malacatepec
German A[]ola	Malacatepec
Jaime Garcia Mu[]	Malacatepec
Julio Lino Solis	Malacatepec
Ortega Ortega Oscar	Gendarmerie
P Hernandez J Alberto	Gendarmerie
G Edwin	Gendarmerie
Omar Garcia	
Moricela Garcia Pina	Productora de ocoxal
Georgina Pina Lopez	Productora de ocoxal
Evodio Hernandez	Productor de miel
Esteban Tobias Gordono	Productor de maiz
Martin Vilchez	Ejido Santa Maria
Samuel Justio	Temascalungo
Apolina Aguilar	Temascalungo
Esteban Martinez	UNAM
José Marcial Perez	CIC Morales
Maximilian Zamora	CIC Morales
Graciela Moreno Martinez	Crecencio Morales
Maria Sanchez Sanchez	Crecencio Morales
Maria de la Luz Guerrero Hipolito	Crecencio Morales
M Josefina []	Crecencio Morales
Cirenia Reyes Gutierrez	Rincon de Hocados
Florentina Cruz H	Rincon de Hocados
Juan Carmona Espinal	Rincon de Hocados

Martin Jimenez Cruz	El Encino
Humberto Alcantar	El Encino
José García Morales	El Encino
Gustavo Chimal Cruz	Carungueo
Erik Estrada V	Capulin
Rosalía Dominguez	CONANP/RBBM
Genaro Mondragon	CONANP/RBBM
Juan Pablo Manrique	CONANP

Annex 6. Maps

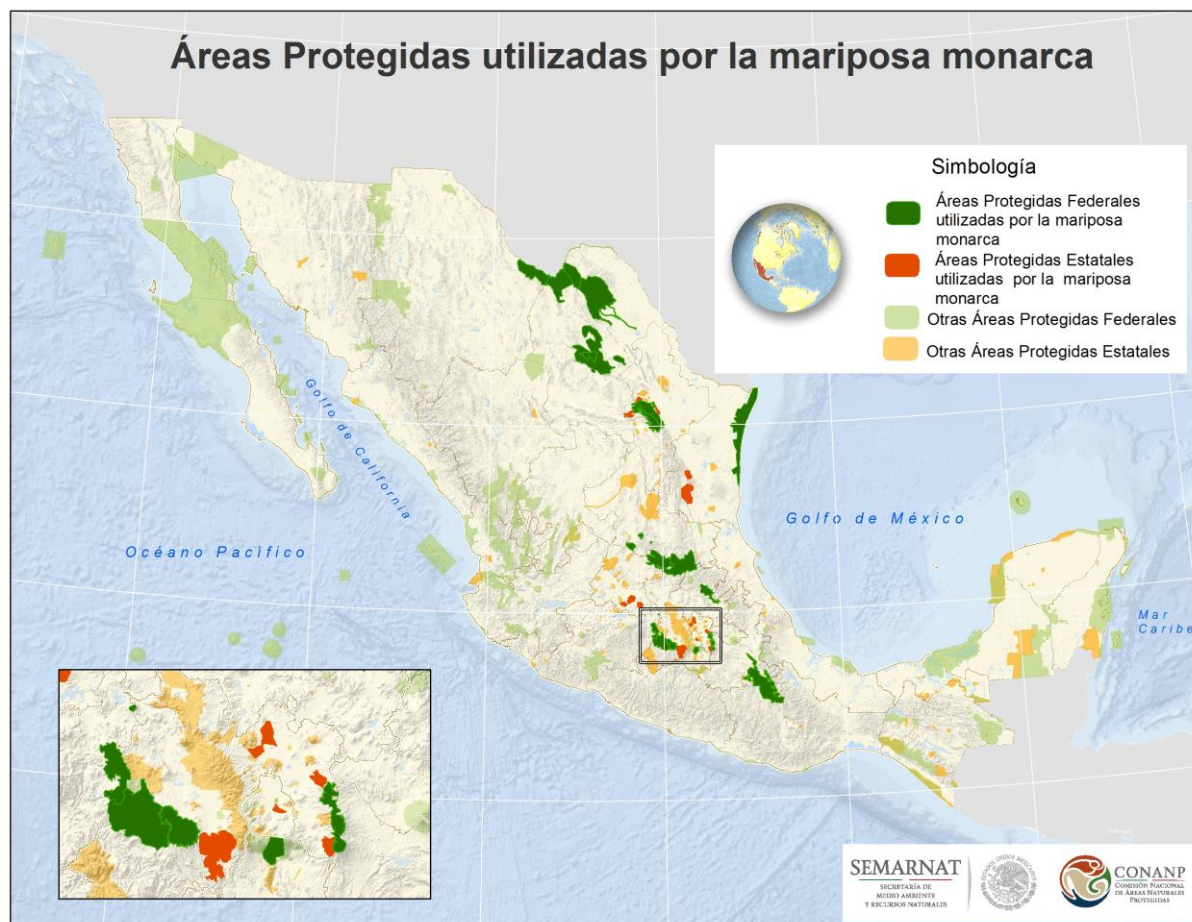
Map 1. Monarch Butterfly Biosphere Reserve

Source: SEMARNAT



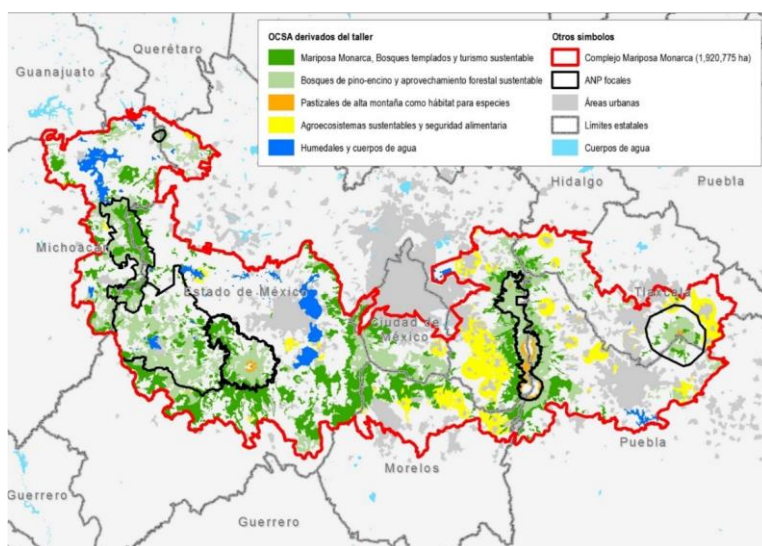
Map 2. Areas used by the Monarch butterfly in Mexico

Source: SEMARNAT



Map 3. Monarch butterfly network

Source: PACC programme



Annex 7. Photographs and other graphical material

All photos © Thierry Lefebvre

MONDAY, JANUARY 29, 2018

MEXICO CITY



Opening meeting

TUESDAY, JANUARY 30, 2018
ZITACUARO



Technical meetings

WEDNESDAY, JANUARY 31, 2018
SIERRA CHINCUA SANCTUARY



Entrance





Signage



Tourism



Illegal logging

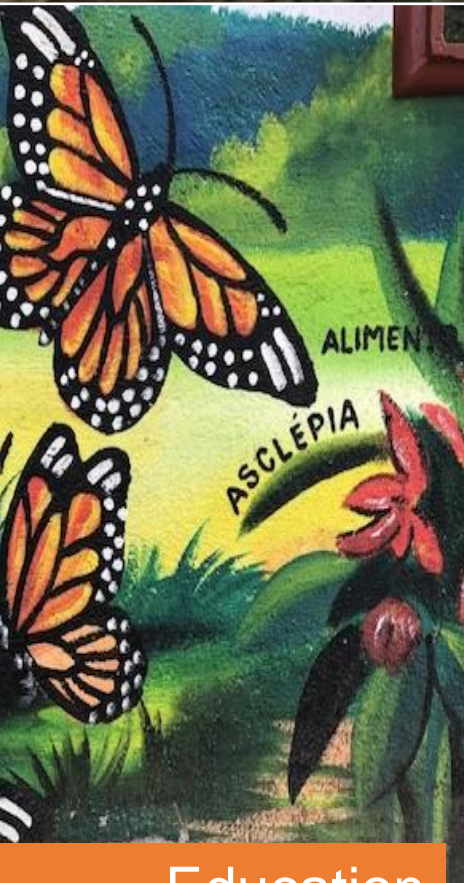


Reforestation

THURSDAY, FEBRUARY 1, 2018
EL ROSARIO SANCTUARY



Community meeting



Education



Visitation



Livelihoods

FRIDAY, FEBRUARY 2, 2018

SAN PABLO MALACATEPEC - ZITACUARO



Gendarmerie



Monitoring



Handicraft

Annex 8. Bibliography

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