Maria Elena Barragan: Hello, my name is Maria Elena Barragan. I'm going to talk about new approaches towards venomous snake conservation in Ecuador. Some aspects to stress are in the biological-ecological aspect, there is an origins to have a better understanding of Natural History of reptiles and snakes in particular, there are only short term funding available for snake population projects or behaviour and also the information available is poor. So, some social aspects that are associated to a snake appearance is that in some studies gives account that animals phylogenetically and physically are closer similar to humans appear more attractive and receive more support in terms of conservation. So, in that sense, this is not the case of snakes, but also a species perceived by humans as useful are more willing to receive support and more acceptance from people. So, the species perceived by humans as as useful in some way they are accepted, but in some other false beliefs and needs are the main reason why many snakes are killed, and appear dead on on ecosystems, but also habitat destruction carried out but by man in, in some situations to obtain resources are also the reasons by which a human-snake impact is its occurring. So, where human and snake conflict exists, there is a close relationship to develop human fears that result into killing snakes. In some orders, we can identify also that there are some deaths on roads. Talking about this socio economic aspect, we consider that areas of high biodiversity are at the same time areas of high poverty, poverty around the world. And we can understand why the human-snake impact is going to be in direct relationship to to poverty. Conservation is therefore in Ecuador experiencing experiencing a crisis in focus, because historically conservation programmes in Ecuador have shown low efficiency or failed because they were only focused considering the biological aspects there is no integration of social aspects within the conservation programmes. And there is also limited participation of local people in the decision making processes of projects.

And just to consider and mentioned that Ecuador, more or less has between five and 8%, about the global biodiversity of snakes in the world considering that there are 3000 species. And also we have the 19% of American continent in snake biodiversity, talking about the Viper family. This undoubtedly places Ecuador among the most diverse countries due to its small size compared for example to countries like Brazil and Mexico. And the reasons why Ecuador present such a great diversity is that the closer we get into the equator, we are going to find the high diversity of reptiles and amphibians and of course, snakes, and the farther we get from this equator area, we are going to find and see less diversity. As you can see, Ecuador is of course located in the most high spot for diversity in terms of reptiles and in terms of snakes too. The reasons for such a great diversity is because our country receives a great influence from the warm current called El Nino comes from the north, the ocean current, which is warm, and also an influence from the south, a cold current from the south. And in our equator, a coastline, these two currents mix, producing lots of evaporation, and lots of clouds are going to migrate to the mountain region. And also, most of the clouds coming from the Amazon are going to join these clouds from the Pacific. And that is why we are going to have lots of rain and lots of humidity, creating the perfect ecosystem for snakes in particular. As you can see, in this map, talking about natural regions, we at least have like 10 different natural regions and divided and distributed all over our country. And these cultural regions are going to have specific characteristics about us to temperature and pluviosity. Also, it's interesting to show natural regions how they are distributed in Ecuador, and how some areas the green ones are already isolated from other big areas of natural forests, making that there is a fragmentation of natural habitats. And if we consider the annual precipitation, for example, here from 2015 to 2019, in the dark blue colour shows pluviosity of higher than 2000 millimetres per year. And talking about an annual temperature for example, in the same year 2015 and 2018, we identified the highest.
temperatures in areas in the coast and areas on the Amazon region up to 25 degrees. So that is why I'm going to show some of the tropical habitats and ecosystems found in Ecuador. This one for example, is tropical dry forest, Western montane forest, cloud forest, tropical Amazon forest, Amazon montane forest, Transition forest, Andean Mattoral. And every single of those ecosystems are having or percent particular pluviosity, particular temperature. And this is why we can have all of the high biodiversity of snakes and as you can see here, in this map, we can have these snakes in the map, are snakes, distributed on the coast provinces of Ecuador. The ones in the middle are snakes distributed in the mountain region. And the ones in the right of this slide are the species distribute on the Amazon as you can see, they we can find snakes all over Ecuador, different attitudes, different habitats and that is the interesting richness of Ecuador.

So in contrast to these high biodiversity, there are main threats to Vipers. We mentioned here, just three, which is high deforestation rates, species distribution is different according to ecosystems, and there is no information about a specific species. So talking about one of the main threats talking about deforestation, this graph shows you red areas where there is highest deforestation and corresponds to the province or origin where due to these small medium size, agricultural practices are the most common deforestation driving factor. This is data collected from 2015 to 2017. And even in this graph, we show that Ecuador has the lowest rate of deforestation compared to other two countries in South America, which is Peru and Colombia. We can identify that there is an impact of losing natural ecosystems and natural habitats in snake populations, and that is going to increase the human-snake impact as well. And as you can see in this graph, and even though, at the beginning I mentioned that Ecuador has the more or less within five and 8% of the world biodiversity of snakes. In contrast to these, you can see Ecuador, it's after United States with also 436 endangered species of different taxa, which is mammals, birds, reptiles, amphibians, and fish, that is just a warning information that is telling us that we need to start talking and working on measures and activities to minimise the impact of of threats to this biodiversity. So, because of that, we consider in our new approaches, the social aspect, and that was after 25 years of surveys and contact with local communities. And up to that time of working those communities we identified the community needs and what would be the driving factors to let communities be more willing to, to not killing snakes. The holistic, these holistic focus in conservation consider four main objectives. The one is to train local people. Second to obtain information ancestral Indigenous vision about snakes, the third to establish connections between communities and researchers, and the fourth to offer training and support in a long term basis. In 1993, the NGO the Ecuadorian NGO I'm working with decides to implement a programme with the community engagement of Indigenous communities located in areas of high biodiversity and community such as Macuma San Pedro San Padre de Catesella from the Amazon were included in this project, but also some other communities from the coast, such as Lapila, Montecristi, Jipijapa. So why we select some communities over others is, as you can see in this graph, and written in red colour, appeared the province of Pichincha province of Morona, Santiago and province on Pastaza showing that these three province has seven from the total of 18 Vipers found in Ecuador. So that is why we select those provinces to start working in this project. This new approach consists of a joint effort within the environmental education programme of the NGO but also the research department which establishes a two way learning processes that include community learns from researchers, but also researchers learn from the community. And normally, places where there is a high snake biodiversity is equal to say high probabilities of human impact. And because of that, during these 25 years of work, we were interested to identify areas of high biological interest, ecological and natural history
increased to develop programmes to establish monitoring programmes of wide populations to ever weigh the status of wide populations of snakes in Ecuador. However, and in interestingly, we identify also about those areas of high biodiversity interest belongs or are at the same time in the same areas where there are human settlements. And that is why we consider that education involving communities is a an important tool that we can identify, we can use to carry out some of our programmes. So this social approach, help us also to call up help to collect biological data, but also epidemiological information about the incidence of the snake bite accidents in Ecuador. But also, we were carrying compiling information that now is in the data that we that we managed, is telling us that within 6000 to 8000 cases of venomous snake bites are registered in Ecuador. And these reports does not of course include isolated communities from the Amazon mainly where there are at least four species considered remain the most important species responsible of the accidents which is Fer de Lance, Arboreal Pit Viper, and one called two striped forest pit Viper and Bushmaster. So these are these are the most common snakes, causing snake bite accidents. And those social driving aspects include to empower and engage communities to strengthen health systems around our health centres in some spots and areas in Ecuador, to ensure safe and effective treatment and prevention, and to increase partnerships, coordination and resources to carry out workshops and training for those communities. And after we develop some of these projects, we identify that there are some similarities in these strategies according to the OMS that are included today to prevent and avoid is made by accidents in communities. And those objectives to carry out the project with the social component was first to training local people in order to recognise venomous and nonvenomous snakes. And that was including children men in productive ages, elders and women responsible for collection and it consists in providing permanent training to the community in order to be able to recognise venomous and non venomous species. But also, we were expecting to reduce the negative impact of snakes in human health.

The second part of our process, a better understanding of ancestral Indigenous people about snakes, where there were the analyses of tension and understanding of the ancestral vision of Indigenous communities about snakes. And this process include talks with Elders, the use of local materials such as clay, or plants to produce colour and the evaluation of local traditions as well as native languages were considered in order to avoid cultural and language barriers that most of children and adults have in the communities. But also this process involves the inclusion of local schools and teachers in the project, but also we were including informal tools and informal mechanisms of learning through campaigns and on through local schools in in those isolated areas. We also consider to increase partnership coordination or resources by which we were obtaining and publishing some of the results of the project. And we were distributing all of this material within communities. We were also organising local workshops. In this particular game, we were part of, of workshop to help the women initiative that was trying to create souvenirs from wild animals and we will train them to carrying out efforts to consist to encouraging entrepreneurship in a in organised women that were trying to obtain a better economical sustainability from the commercialization of these souvenirs and we were training them to obtain these souvenirs.

We were also helping to strengthen the health systems by establishing connections which between local communities and local authorities and communities and promoting the availability of anti venom in isolated areas. But also, we were encouraging to the establishment of connections between local communities and authorities to make possible the creation of emergency protocols that are going to guide treatment and assistance to locals in the case that they suffer snake bite accidents. And also we were trained offering training and support to, to medical doctors and medical
systems to create a prevention about local practices were low local communities have a great range of practices that make snakebite accidents really bad. So educating local communities about prevention and ensuring medical treatment in those communities is a way to provide long term and sustainable health support to those communities as well. So here, we are just going to mention some reasons why we need to keep going and carry out long term projects around these, these topics. One of those is considering the distribution of some snakes are just in some tiny spots in Ecuador, we don't know much more information about natural history of this species and disease, the need to get more information to be able to to elevate the impact of a snake bite the human population. This is the case for B. Iojanus in the south part of Ecuador. This is another located in one little spot on the coast where there is found near habitated areas. There is also another one located in the last remnant of region and that is why this is important or these are the considerations we are making to be able to carry out projects in this area of research. And this is also another species distribute in a mountain region. And just highlight where until now we don't know the taxonomic classification of some snakes like this one coming from the south in Ecuador. This is another one coming also from the south, where we need more taxonomic and systematic work to be able to classify and identify the species of snakes. That is another one. And every single effort carried out by our team of herpetologists technicians, is to be able to get more information about this particular group of reptiles. We identify groups of communities that are interested in work with us and receive training.

We also carry out an important compilation of data from captive management of some of the species that are rare for our country. And the long term process with all of the information that I am providing to you, we can establish and we can generate trust and commitment between researchers and communities. And that would be the starting point to be able to to start a conservation programme that probably is going to help to answer some questions, such as in what expanding impact in human health, from this type of fauna could change after a long term process of community engagement in fieldwork and education. How do people from different origins, education, religion, cultures, and also professional backgrounds react or feel about this kind of community involvement associated to venomous snakes? Can they help to identify key issues or a better integration of their views into the decision and priority making process for snake conservation, how these people can through networks of a small community base, influence the visibility and applicability of conservation measures for snake conservation programmes.

These are just some of the answers that we need to identify after long term processes and one of the answer is that, in fact, we can answer those questions, but we need like 25 more years work of course, where we can already can say that some of the outcomes are we are carrying out long term training of local people identify that helping to identify animals from non venomous snakes and these can result in a community involvement at different levels. Local researchers are supporting fieldwork in those communities, educating new generations can be a can be a activities and objectives that can be replicated in their native language with their own experiences, conservation processes with the inclusion of social aspects must must be measured after 10 years or more. And then we will, we will be able to see more or less if there is an impact a good or a bad impact. And also the improvement of the social capacity of communities to be part of collaborations and external co-operation. I would like to say many thanks this is the team of work, doing their efforts at different levels, and all of us, we are party to Ecuadorian NGO working in these great projects. So thank you very much.