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GREEN ISSUE:
THE NEW ECOLOGICAL IDENTITY OF ARMENIA

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DIRECTOR'S NOTE

Dear reader,
We are extremely happy to present you our special issue entirely dedicated to the environment, its challenges and potential solutions.
The Green Issue has been in production for more than six months. During that time, we not only tried to understand and assess all the ecological challenges that Armenia and the Caucasus Region face or will face in the near future but we also tried to uncover the organizations and individuals who are making the overall positive tone of our publication possible.
Yes, there are a lot of challenges – from global warming to deforestation, from devastating impact of mining to the issues surrounding Lake Sevan, from substantial losses in biodiversity to the much needed rethinking of the ecological responsibility of the organizations and so on… but when we dived into all those issues we found some positive, encouraging signs which filled us with hope and maybe even with the expectation that many of the challenges we face, at least on the national level, will be addressed adequately.
The symbol of the changes that we are just now starting to witness in various fields of environment is undoubtedly the Caucasian Leopard. The Government of Armenia declared the year of 2019 "The Year of the Caucasian Leopard".
The leopard, which was considered extinct in the territory of Armenia only a few years ago, is now back to the Khosrov Reserve. The recovery of the leopard population was made possible only because of the recovery of the entire food-chain, an extremely complicated and multilayered task. And that in itself is symbolic – we need new complex solutions, new modern approaches and new philosophies to deal with sometimes overwhelming environmental problems. The good news is we now have more and more organizations and individuals who focus their attention on environment dedicating their time and efforts and of course, money to the ecological challenges.
I would also like to use this introduction to thank our many partners, especially the Ministry of Environment of the Republic of Armenia and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), without whom this Issue would simply be impossible. They do so much to preserve our nature and bring new solutions to our ecological challenges.
So, please enjoy the Green Issue, listen to its podcasts, which are available on our website, and decide for yourself what actions you yourself can undertake in order to contribute to a better future for our children, for our country and for our planet.

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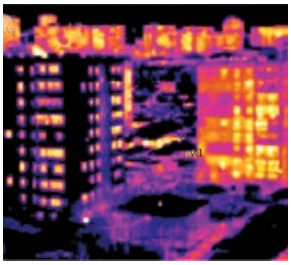


ARTIFACT

ERIK GRIGORYAN:

"We Should be Both Optimistic and Ambitious"

Environment protection has become a central issue for all societies and states across the world, and Armenia is not an exception. Amulsar, Sevan, burning forests, and the global question of climate change: all these issues have been at the headlines of news for several months. Regional Post spoke with the Minister of Environment Erik Grigoryan to shed light on the approaches and views of the Ministry on these matters.

INTERVIEW : ARSHAK TOVMASYAN / PHOTO : RA MINISTRY OF THE ENVIRONMENT

Globally speaking, recently, Armenia participated in the UN Climate Change Summit. What did we learn and what is the role of Armenia in the solution of these global issues?

— First, I would like to mention that Armenia is actively engaged in the processes happening on the international climate and environment platforms. We signed and ratified the Paris Agreement setting the stage for climate action. Armenia is, perhaps, one of the pioneers when it comes to active engagement with large climate funds, such as the Green Climate Fund (GCF). The GCF is the largest climate fund, whose platform will play a key role in utilizing parts of the USD 100 billion – the financial commitment made by the developed countries under Paris Agreement from 2020. Armenia has a number of climate projects financed by the GCF including the National Adaptation Plan for the amount of close to USD 3 million, a USD 20 million project on retrofitting buildings for energy efficiency, as well as Readiness support. It is also important to note that Armenia is the first country in the region to have a national accredited entity under the GCF – which is the Environmental Project Implementation Unit. I am also happy to inform, that Deputy Minister Irina Ghaplanyan is a Board member of the GCF along with 11 representatives of developing and 12 representatives of developed nations. Reflecting on bilateral engagements, our Ministry has a number of bilateral MoUs on cooperation in environmental sector with an extensive list of governments, most recent of which was signed with China and the United Arab Emirates. Recently, I had the honor to represent Armenia in the Climate Summit of the United Nations. In our written statement delivered to the Summit we presented an innovative climate finance mechanism, which our government has worked on over a year and which offers a great opportunity both for developed and developing nations to meet their climate commitments under the Paris Agreement by means of utilizing the debt-for-nature swaps. This mechanism was also communicated to the President Macron of France and we have been working with his cabinet. This mechanism is not limited to Armenia and in case of success, it can become a scalable for the rest of the world.

Which three sectors in Armenia would you highlight in which we will see considerable changes in the future?

— I can speak about where we already have significant changes. We have progressed with small hydro-power stations on sustainable water resource management, limitation of excess water abstractions and many other matters. With the previously

operated hardware set up these stations have causing major environmental damage by depleting the water in the rivers. This is because the proper water flow meters were not set up and were not being overseen. We had also had positive changes in water use licensing, both from bureaucratic and content perspectives. We progressed in the forestry sector as well. Two days ago, during the government session at the National Assembly, I was accused of the depletion of firewood and that the costs for it have increased, to which I responded that there would be very limited qualities of fuelwood and that we would have to find alternatives for the heating and cooking needs of our rural communities. We are also continuing to review legislation on both water and forest sectors and intend to have substation legislative proposals for both. The processes are optimized. For example, previously, environment monitoring was the responsibility of our Ministry, the forest monitoring was the function of the Ministry of Agriculture, hydrometereological monitoring was conducted at the Ministry of Emergency Situations and Zvartnots Meteorological Monitoring was transferred part of the Transport Ministry. Now all these entities are incorporated under our Ministry's umbrella, which will allow us to optimize, consolidate and innovate all of these crucial monitoring functions and services.

Now one of the most important question for today – mining industry. Where are we now and in which direction are we going?

— Currently, 28 metal mines have received operation permissions but in fact only 6-7 of them actually operate. These mining sector activities together with the environmentally inadequate legal framework resulted in large-scale environmental pollution. The pollution prevention was not sufficiently regulated and the amount of compensation was not calculated properly, which created a situation where it is more beneficial for the mining companies to overuse the resources instead of conducting preventive activities. In many countries fines and penalties for air and water pollution and tailing dumps are quite high, so preventive measures operations are more financially sound and also required. In Armenia, many companies bypassed preventive measures as the fines for polluting the environment were extremely low.

Where are we in terms of Amulsar?

— When the Investigative Committee received the final report of ELARD – the company that undertook third party assessment of the Amulsar gold mine project – we received instructions from the government to examine the report and provide feedback. In this process we reached out to other relevant governmental bodies and scientific institutions and gathered respective data. As a result, we had several revelations which, at this moment, I would rather refer to as inconsistencies. Some of these will be clarified after the Inspectorate for Nature Protection and Mining Resources undertakes relevant inspection, and the rest – after the Investigative Committee concludes relevant investigations. The changes to the submitted plan of the mining project and the question of whether or not the respective official state bodies had been properly informed about these and some other matters will fall in the spectrum of the Inspectorate's inquiry.

Consequently, we don't know whether or not there's a need for a new EIA, do we?

— The relevant legislation of Armenia does not stipulate any legal provision whereby an EIA could be immediately revoked, with the exception of provision, which states that in case if a mining company does not proceed with any functioning activities ranging from opening and construction to mine operation for one year. However, even in this case the Inspectorate for Nature Protection and Mineral Resources must visit the site, check and document it. In all other cases, be it a change in the project, unaddressed violations, a new ecological factor, etc., the relevant legislation requires a series of actions to be taken before the EIA can be revoked. It can be inspections or an inquiry undertaken by the Environmental Impact Expertise Center state non-commercial organization. So legally it is not possible even if there are any inconsistencies in the EIA for a Minister to deem an EIA invalid immediately.

You've mentioned that only around six from 28 metal mines are active, but are there going to be any measures for the rest 22?

— Yes, the Law on Environmental Impact Assessment and Expertise has a provision, which states that if in one year after having received the

MINING SHOULD BE A TEMPORARY ACTIVITY. THE MINE IS OPENED, THE RESOURCE IS UTILIZED, THEN THE MINE IS CLOSED, RECULTIVATED, AND THE TERRITORY IS RETURNED TO ECONOMIC AND ENVIRONMENTAL BALANCE

SOS Sevan

Sevan's green surface, 2019

license, the mining company does not undertake any operations, then the permit can be deemed invalid. We have applied to the Inspectorate for Nature Protection and Mineral Resources with inquiry on the status of these mines and have received information that there are more than ten metal mines which do not operate and have reported this information to the Ministry of Territorial Administration and Infrastructure Development, which is the state body in charge of revoking their licenses.

Some people claim that in a long term perspective, mining is not beneficial for the country. In today's Armenia, do we have an accurate strategic approach regarding how we view the mining sector in the long run?

— At this moment, the mining strategy, which is to provide answers to all the questions you've mentioned, is in the development phase. This might sound strange but, in my opinion, the operations of small- and medium-sized mines should be eliminated, because although small or medium they still can cause substantial damage to the environment without appropriate benefits in terms of boosting the economy and providing sufficient employment and taxes. Nevertheless, several of our large mines, such as Zangezur Copper-Molybdenum Combine, must first and foremost comply with the principles of preventing pollution to begin with, as opposed to paying fines for polluting. All in all, mining should be a temporary activity, i.e. a mine is opened, the resource is utilized, then the mine is closed, recultivated, and the territory is returned to economic and environmental balance. Currently, we don't have this practice in Armenia, but the Ministry is working towards this. In the long run, I think that mining is not a prospective sector for Armenia.

Let's talk about Sevan because recently it has become another central issue for discussion. The story of environmental pressure and negative impact on Sevan goes back to early 1920s-30s. What is the state of the lake now?

— Sevan is a strategic water resource not only for Armenia but also for the region. Due to decades of unsustainable management of the lake today Sevan is experiencing a significant volume of pressure on its ecosystem, ranging from human-induced pollution to climate change. Given the immense pressure on the lake, we are currently working on devising an integrated water resource management plan for the lake, the first goal of which targets reducing the pollution inflow into this strategically vital water body. However, simply not polluting the lake is no longer sufficient, because the accumulated nutrient volume in the lake, which was built up over the decades of inflow of untreated community waste water is already putting an immense and unsustainable pressure on Sevan, and on top of preventing pollution, we also must work in the direction of eliminating new inflows of nutrients as well as removing, where possible, all the existing point source of nutrient inflow. At the moment, the Ministry is working on finalizing a road map for reducing this pressure. This plan involves detailed activities ranging from meticulous cleaning the coastal areas to suggestions on capturing farming and agricultural run off into the lake. Last year, our staff worked on clearing visuals captured via satellite and drone imagery to identify the areas located at the forecasted increase of Sevan's surface, currently standing at the elevation of 1901.5 meters above the sea level. It is planned to clean up to 800 hectares of potentially swamping coastal area of the lake in the next three years. In 2020 we have allocated the required funds for the state budget to undertake the coastal cleaning activities and what is important to note here is that since we have increased the total area subject for cleaning the unit cost per cleaning has decreased. For example, if in the previous year the Ministry undertook activities to clean up to 100 hectares of coastal area, in the coming year we plan to clean up to 280 hectares of already swamping coastal area for almost the same budget. We strongly believe that with more hands on approach we will have a significant improvement in efficiency of conducted cleaning and mitigation measures. In addition to these measures we have also initiated a series of field work activities to collect data for calculation of potential costs of building sustainable sewage management systems for the coastal communities and what would be the potential financing options for placing biological wastewater treatment systems in at least three coastal and near-coastal towns. We have communicated our findings to the government, and the Prime Minister's office has instructed the Ministry of Territorial Administration and Infrastructure Development to assess the financial and technical estimates for these measures to be undertaken. This year we succeeded in not only reducing the volume of water discharge from the lake by around 30 million cubit meters as compared to previous years, but also

Hovtashen storks, victims of the pollution

ecomews.am

in discharging even less than indicated in the submitted permission. In addition to that we succeeded to stream significantly larger volumes of water into Sevan via Arpa-Sevan hydro tunnel. We have to further expand these measures as we are observing change in climate patterns which has led to increase in evaporation by around 100 million cubic meters as well as reduced inflow from the rivers. We have to realize, that we can't continue doing "business as usual", we not only have to reduce the pressure on the lake but start actively remediating it.

What about environmental pollution by different businesses and companies? We have the example of the storks in Hovtashen. Generally speaking, what is the approach of the Ministry in such cases?

— Look, in the post-Soviet countries the concepts underlying the policies of environmental protection are based on the principle of "polluter pays", meaning that when a business causes pollution it pays fines for the damage. However, unfortunately the fines for pollution are usually too low and certainly not enough for remediating the loss and damage caused to a given ecosystem. At the moment we are working on developing new legal provisions that will fundamentally change changing the approach towards environmental management thus transition from the concept of "polluter pays" to preventing pollution to begin with. This approach would require upfront measures to ensure that the right mitigation measures are put in place, but in the mid to long term perspective this model is actually more economically beneficial for businesses. In the scope of this undertaking we have already brought forward some new legislative measures. For example, we have enacted stricter provisions for criminal and administrative charges for offence related to illegal logging. We also have introduced legal amendments pertaining to more sustainable operation of hydro-power stations as well as prevention of illegal water wells. This is just the start. In the next few years we foresee introducing up to 250 legislative proposals. While the goal is to produce more rigorous environmental policies, we also aim to ensure that we maximally simplify various administrative procedures.

YOUNG GENERATION IS BECOMING INCREASINGLY DEMANDING FROM GOVERNMENTS TO MAKE REAL COMMITMENTS AND TAKE ACTION TO ENSURE THAT THEY ARE LEFT WITH SUSTAINABLE AND THRIVING PLANET

Environment protection has become an important topic for society, especially for youth. Take the example of Greta Thunberg. Do you think that this active involvement of young people has a positive effect on decision-makers?

— Yes, absolutely, and not just positive, but I also believe that the youth can have a much larger impact by being demanding. Moreover, on different international platforms we always emphasize that youth has the most power to bring significant change. Young generation is becoming increasingly demanding from governments to make real commitments and take action to ensure that they are left with sustainable and thriving planet. Youth today is aware and well informed and always poses poignant questions. Today, Greta Thunberg is the most vocal proponent of climate action but this young activism is not new. Back in 1992 during the Rio Conference Severn Suzuki, a 12 year old girl shook the world by her poignant speech, raising sharp questions about biodiversity, water management and other environmental issues. This triggered a number of processes and I would attribute it both to Rio as a major undertaking but also to Severn and her passionate speech.

So, we can be optimistic about the world and Armenia, in particular?

— In case of Armenia, we should be both optimistic and ambitious. For example, now we have a project aiming to double the forest cover of Armenia by 2050, which is a large-scale and very ambitious undertaking, but I believe that despite the imminent challenges we must pursue its implementation. The mechanism I talked about earlier suggests combining the commitments of developed countries taken under the Paris Agreement together with the debt-for-nature swaps. This potentially will streamline the much needed large-scale finance for the measures that need to be undertaken for the increase of the forest cover. This will have lasting and positive impact not only from environmental but also social-economic perspective, as many communities will get involved in large-scale afforestation operations.

SAVING THE PLANET:
Paradox of Centuries

What is Armenia's perspective on climate change mitigation and why is the idea of saving the planet paradoxical? Regional Post discussed some of the central questions of the environmental agenda in Armenia and the world with the Deputy Minister of Environment Dr. Irina Ghaplanyan.

INTERVIEW : ARSHAK TOVMASYAN / PHOTO : RA MINISTRY OF THE ENVIRONMENT

We have witnessed a number of very hot and dry summers over the past few years. Is this becoming a new norm?

— Scientific data and forecasting is telling us that it is going to get even hotter and this will take place across the country. The most recent data tells us that if before the temperature increase that we had registered stood at 1.23 degrees Celsius, the most up to date information has brought that number to 1.3 C. In addition to the increasing temperatures, we have also registered a decrease in precipitation, which currently stands at 9%. This is very alarming especially for Armenia – a country whose economy largely depends on agriculture.

What does Armenia do to overcome this situation? Do we have a strategy?

— Before jumping into our projects and strategies, I would like to mention that Armenia has signed and ratified the Paris Agreement, and with this historic agreement along with many developed and developing countries, committed to tackling climate change. This agreement was essential in establishing climate justice – that is, documenting that warming of the planet is due to greenhouse gas emissions and the lion portion of these emissions fall on the shoulders of developed countries. Moreover, this agreement ensured that developed countries took commitments to support developing nations in climate change adaptation and mitigation measures.
As a political scientist for me the issue of climate change is the most pressing global challenge today, because we all – developed and developing nations – have to come to an agreement and make immediate changes in the way we run our economies, i.e. ensuring just transition to a sustainable model both from social and economic perspectives while at the same time reducing greenhouse gas emissions.
There was a great momentum during and after the signature of the Paris Agreement back in 2015, however, as

some of the large developed economies are stepping back and withdrawing, the process has largely stalled. There was a great hype in the run up to the Climate Summit this year in New York, to which the UN Secretary General called all the nations to "come with a plan, not a speech." But unfortunately, instead of hearing strong commitments from the biggest emitters in the world to ambitious GHG reduction plans, we heard mediocre commitments or even at times adversary sentiments. Luckily, the voice of the youth was loud and clear and I am sure we will witness a great momentum and a snowballing effect from the new generation demanding climate justice and ownership of our generation's leaders to commit to ambitious action in order to prevent the climate perils of our planet.
The window of making drastic and critical political decisions on the way we globally run our economies is narrowing down very fast. Major GHG reduction strategies and actions have to be adopted and kicked off in the next 10 years – essentially, the global economy at large and largest economies in particular have to fully readjust from fossil fuel energy dependency to renewables. Is it doable? Yes. Is it going to be costly and incredibly difficult? Absolutely. But these changes must be viewed from the perspective of long term both economic as well as environmental investments. Because if we do not take swift and large scale decisions and actions today, the costs of environmental, social and economic loss and damages to the livelihoods of nations around the globe would be so vast that it would virtually be impossible to calculate let alone manage.
On the bright side, I want to say that although this is perhaps one of the most critical periods in human history where both developed and developing nations have to come to a mutual understanding, make political decisions of planetary scale and take swift and joint action, the scale of which is unprecedented, I do believe that humanity after all will want to save itself on this planet. We must understand that this is an existential issue for us as species – the planet existed for 4.5 billion years and it will continue to exist whether we make joint political decisions or not.

So how does Armenia figure into this planetary bargain?

— Well, for us it is important to remember that no country is too small to make a difference. Armenia has a unique opportunity to be a poster child of climate smart transition – we are a fossil fuel importing country with a very strong potential for growth of renewable energy. So we have a good opportunity to continue what is called 'decoupling' – the movement of two important curves in climate related calculations further away from each other: the curve of economic growth going up, and the curve of GHG emissions going down.
As part of the commitments undertaken under the Paris Agreement, Armenia along with other signatories has committed to developing the so called Nationally Determined Contributions. This is a set of long term goals, which the country commits to in order to reduce its emissions and to adapt to the impacts of climate change. This is a very complex and comprehensive document, and currently Armenia is working on its preparation with the support of a number of international organizations and partners.
Equally important is the National Adaptation Plan – this is a very crucial plan for Armenia, which is aimed at conducting comprehensive medium and long term climate adaptation planning. This plan spans virtually all sectors of human activity from health to transport, from agriculture to urban planning. One of the most important outcomes expected as a result of NAP is integration of climate change into Armenia's national decision-making. It is important to remember, that as the temperatures continue to rise, and as we experience a decrease in precipitation, we would have to adapt virtually all infrastructures and sectors of our livelihoods.

The processes you've mentioned are quite extensive in their scale. Thus, they definitely require massive financial investments. Where would the funding come from?

ARMENIA HAS A UNIQUE OPPORTUNITY TO BE A POSTER CHILD OF CLIMATE SMART TRANSITION – WE ARE A FOSSIL FUEL IMPORTING COUNTRY WITH A VERY STRONG POTENTIAL FOR GROWTH OF RENEWABLE ENERGY

— Indeed, they would and thank you for bringing up this question. As I stated, in the framework of the Paris Agreement developed countries have committed to supporting developing nations, and this support also entails financial assistance. It may come from different platforms and organizations, including the funds created in the framework of the United Nations Framework Convention on Climate Change (UNFCCC). One such platform and the largest climate fund in the world is the Green Climate Fund (GCF). Armenia is one of the most active if not the most active country in our region in the format of its engagement with the GCF – this is reflected both with our presence on the Board of the GCF as well as Armenia's climate project portfolio, a lion portion of which is funded by the GCF to include the above mentioned NAP. The Fund's 10th and one of the largest projects in the region is the $20 million project on "De-risking and Scaling-up Investment in Energy Efficient Building Retrofits" coordinated by the Ministry and implemented by the UNDP office in Armenia.
This year the GCF is entering its second and crucial replenishment, where developed countries contribute to the Fund. Crucial because in the wake of 2020 the commitment of developed countries to mitigating the risks associated with climate change and to helping developing countries to adapt to climate change will be tested in the form of their financial contributions to the GCF as well as to other platforms and initiatives. It is important to note here, that under the Paris Agreement developed countries have committed to mobilize $100 billion in climate finance per year by 2020. In light of this as well as taking into consideration that besides the platforms of the existing UN funds there must be other working platforms and mechanisms for developed countries to allocate climate finance, Armenia over the past more than a year has been working on developing an innovative climate finance mechanism. We have communicated the details of this mechanism during the UN Climate Summit in New York this past September, but in brief, this mechanism employs the concept of debt-for-nature swap and works on a bilateral level between a developing and a developed country. For Armenia, we foresee working with at least 5 bilateral partners, with France and Germany being the first countries, with whom we would like to kick off the debt-for-nature or debt-for-climate swap. This is a win-win mechanism, because developed countries also use this opportunity to meet the commitments that they have taken under the Paris Agreement. We have already commenced our negotiations with France and are very positive that the process will be successful. Moreover, we are quite confident that should this work for Armenia then it will become a successfully scalable model for the world.

ARMENIA HAS TAKEN AN AMBITIOUS COMMITMENT IN THE FRAMEWORK OF THE BONN CHALLENGE TO DOUBLE ITS FOREST COVER BY 2050, BRINGING IT TO ITS ORIGINAL OPTIMAL COVER

Coming back to more local problems, let's talk about the forest issue in Armenia. In the past years, this problem has become quite vocal, but still, it doesn't receive well-deserved attention and respect from society, even though Armenia has a commitment to restore its forest cover.

— Over the past 30 years Armenia has recorded an extensive forest loss. According to the GEF data, Armenia's optimal forest cover stood at 20.1% of its total territory, but unfortunately, by various accounts due to illegal logging and unsustainable forest management Armenia has lost close to half of its original forest cover. But at the same time, Armenia has taken an ambitious commitment in the framework of the Bonn Challenge to double its forest cover by 2050, bringing it to its original optimal cover. In reality, this is a very ambitious plan, as it would require reforesting around 260.000 hectares of Armenia's territory. Nevertheless, it is doable especially once we create the right infrastructures and work streams. The challenges are that Armenia is a mountainous country and does not have an abundance of low elevation land suitable for reforestation, additionally, as noted, we do not have the necessary capacity in terms of nurseries for saplings as well as reforestation skilled work force and quality monitoring to ensure good survival rate of the plantings. However, all of these challenges have good and systemic solutions, and we intend to work with all interested stakeholders in order to ensure that we meet this goal. It was in this spirit that the Prime Minister, together with Minister Erik Grigoryan and CEO of FAST Foundation Dr. Armen Orujyan made the announcement on October 18th during the Global Innovation Forum on the 10-10-10 project, which entails planting 10 million trees on October 10th of 2020. As we do our job as a government agency in charge of reforestation, we need to bring everyone on board in this effort as we all collectively benefit from more trees, but more importantly, this initiative intends to raise awareness and call to action everyone to take ownership of their future

Could you tell us a few words about Armenia's biodiversity? Recently, there has been some positive progress with conservation efforts of the Caucasian Leopard and this year was proclaimed as the year of protection of the Caucasian Leopard. Could you elaborate a little bit more on this?

— Armenia has unique biodiversity – yet not many know about this and it is our goal to promote this and raise awareness both domestically and internationally. Armenia is in the top 25 biodiversity hotspots with very unique pockets of small yet very diverse

ecosystems. Additionally, Armenia is considered as a very important route on the migrating paths of birds and you can spot unusual species for this region such as pelicans or flamingos twice a year, as they stop to feed and rest. Biodiversity documentation and conservation is a very hard, meticulous and systemic work, and requires a lot of knowledge, experience and skill. On this note I want to thank our partners, particularly the German Government for supporting Armenia in undertaking very important work on conservation of our country's unique biodiversity.

So why did we focus this year specifically on the Caucasian Leopard – well first of all, it is a critically endangered Red Book specie and the largest surviving feline in the whole of Europe. Such large carnivores are key to ensuring that the balance of the ecosystem stays intact. If they disappear, the balance of the ecosystem shifts and we can witness various chain reactions from loss of some species to dangerous overpopulation of others. Equally important were the conservation efforts of the Caucasian Leopard that have been conducted together with various local and international organizations, which have led to a series of successes, to include the increase in the total head count of this beautiful and majestic feline. There is plenty of evidence that we have increased population of the leopards, which is mainly documented through the motion capture cameras installed across the habitat areas of the animal. The other important factor that has led to the success in the feline's repopulation efforts was the restoration of the population of the leopard's main source of sustenance – bezoar goats and Armenian mouflons. This is yet another important example of how well balanced the ecosystem is, and Armenia is not an exception. With these positive achievements and in the spirit of spreading awareness about the significance of conservation of the feline, the government of Armenian announced 2019 as the Year of Protection of the Caucasian Leopard. This year we had a number of events featuring the Leopard – from minting a special coin by the Central Bank with a photo of the Caucasian Leopard engraved on it, to publication of a new postal stamp to Caucasian Leopard being this year's mascot for the Yerevan Marathon. We want to thank all the partners in helping us spread awareness about this majestic creature!

Do you think that humans and nature are compatible?

— This is an existential question yet perhaps it is more relevant today than ever before. The problem with humans is that for centuries, as species, we considered ourselves outside of the ecosystem. This historically has been one of the most fundamental errors of our existence on this planet – through this prism, of viewing ourselves as outside of the ecosystem, we continued to extract from nature, pollute the environment and put ourselves on the pedestal or rather outside of the ecosystem. In reality, true balance can be achieved only if we position ourselves inside the ecosystem. And we need to stop pushing forward this narrative of saving the planet, we need to start realizing and acting on the simple truth that a balanced and respectful attitude and approach to the environment saves us as species on the planet. Earth will live on – we need to figure out how we, as species survive, and we can do so only collectively and by respecting and caring for the nature.

SAVING THE LIFE-GIVING SPECIES OF OUR ECOSYSTEM

"The restoration of the forests should be a pan-Armenian initiative as this is not a task of only one person or organization. We have to do this with mutual efforts. I believe it's possible," says Vardan Melikyan, the newly appointed Deputy Minister of the Environment. We talked with Mr. Melikyan about the main causes of forest fires in Armenia and discussed the approaches fostered by the Ministry.

INTERVIEW : ARSHAK TOVMASYAN / PHOTO : RA MINISTERY OF THE ENVIRONMENT

Mr. Melikyan, you entered the cabinet this past summer, at the peak of the forest fires in Armenia. Why do we have this amount of fires? Do we manage to control and fight them successfully?

— There are many reasons for such active forest fires, mostly human-related: still burning cigarette butts on the ground, not extinguished bonfires, and other such cases become a direct cause. Another cause is the unsustainable management, which resulted in degraded forests with favorable environment for fires. There's also a global reason for this – the climate change which caused dry and hot weather in the months of July and August, and the lack of sufficient precipitation.

The firefighting part is organized at sufficient level, all relevant institutions cooperate successfully. For example, Hayantar SNCO employees and rangers of protected areas work closely with the Ministry of Emergency Situations, and the Ministry of Defense joins the operations if necessary. In some areas we also have volunteers from the local communities. All of these are response measures, but we have to think about prevention. I would lie if I said that it's possible to eliminate all forest fire risks, but we can significantly reduce the number of such cases. Here, we have long-term, mid-term, and short-term tasks to accomplish. In the long term perspective, the goal is to make the ecosystems more resilient via fostering the improvement of forest management. This will take decades, but we have to start the works today. In the mid-term phase, we have to focus on awareness-raising activities and educating people. Finally, our short-term goal is to develop information systems. Currently, the Ministry of the Environment in cooperation with UNDP designs Forest Fires Information System. The latter will enable us to predict fire risks a week or ten-days prior, based on the analysis of up-to-date information received from satellitesand meteorological stations. Depending on risk level, official actions, such as banning open fire at specific locations or prohibiting human access, can be issued.

We saw on the news that starting from October 1, the salaries of the foresters were increased, so I want to talk about the specialists in this sphere. Do we have any HR problems?

— I can say without unnecessary diplomacy that yes, we do. We have a problem here taking into account the lack of relevant educational opportunities in Armenia. In Soviet times, Armenian specialists used to receive their education either in Georgian, Russian, or Ukrainian institutes. As a result, we had people with relevant knowledge. However, since the profession was relatively unattractive in recent years, most of the graduates worked in different spheres and had no practical experience. Regarding the increase in salaries, it's a significant step, especially because at this moment, the wages of only the lower ring employees – foresters and forest guardians – are raised. In my opinion, these people have crucial importance forest management, because they are the ones who directly interact with the forest and respective stakeholders. By empowering the lower ring, we will be able to fight the illegal activities and, from a long-term perspective, even eliminate these.

Elaborating on the topic of illegal activities, namely the loggings, the serious approach of the Government received quite a positive response from the society. What has changed in the outlook of the Ministry?

— The increase in salaries is one of the steps towards the improvement of the situation. When talking about the elimination of illegal logging, we should separate the people involved in these activities into at least two groups. The first one includes people who do that for social reasons. When there's no fuel available and their income doesn't enable them to purchase it, their primary resource becomes the firewood. For this case, we consider the development of an alternative energy resource market, namely the briquettes, which can be produced from any biomass. Currently, we're studying the model of Moldova. In just five years, they managed to develop the briquettes industry to a point where about 10 percent of overall energy demand is covered by biomass. According to estimations, we have biomass enough to replace around 1 million cubic meters of fuelwood. Of course, this is an optimistic prognosis but we have this estimate, and even though the part suitable for replacement is smaller, we still have a vast potential. The second group involved in illegal logging includes those, who used to regularly conduct illegal logging in the forests via exploiting the locals. The latter received money from these groups, but that wasjust a small part of their actual income from wood sale. There was information in the media that the protests that took place in Ijevan were organized by these illegal businessmen and had no social basis. Obviously, in this case, we cannot speak about tolerance. We cannot sacrifice our forests for their prosperous lives. Here, we cooperate with police and other law enforcement bodies. There are police bases established in Tavush and Lori, and there is cooperation with the Inspectorate for Nature Protection and Mineral Resources which has the control function. This helped decreasing the number of cars, transporting fuelwood to the central marzes of Armenia. However, I want to mention that there's also legal fuelwood, which is harvested and sold by Hayantar SNCO and it mainly goes to the central marzes because the residents of forest areas either don't have enough money or they have an opportunity to receive up to 8 cubic meters of deadwood. Of course, we have to be attentive when we see fuelwood on sale, but it's not always illegal.

But how can we distinguish one from the other?

— First of all, they must have proving documents, the so called "forest ticket," which indicates the car and the transporting person, etc. Recently, during one of our visits to Tavush, we came across such a vehicle. In that case, everything was OK, the information on the paper matched the car and the quality description of the fuelwood, etc. If you have doubts, you can approach the Inspectorate, which has the capacity to verify whether or not the firewood is legal. On the other hand, I have to highlight that selling the fuelwood from the cars can be a case of illegal business.

In the past 30 years, how much damage was caused to our forests and in what condition are they now? As far as I know, in previous decades, 20% of the Armenian land was covered with forests, but now this number hardly exceeds 11%.

— Last time Armenia had 20% forest cover was at least hundred years ago, and during 1930's industrialization and WWII the forest coverwas significantly reduced, encompassing only 7-8 percent of the land. After this, large-scale forest plantings took place and currently, we have around 11%. Here the issue is not only about the forest cover. We can have about the same cover but not the same forest. The species are changing. Our quality tree species gradually disappear. Of course, there are no bad trees, but the ecosystem services the forests can provide depend on the species of trees we have. The second issue is the density of forests. If previously we had locations where the forest density reached 100%, today this percentage too has decreased. As a result, the soil changes and consequently, the vegetation growing under the trees changes too.

Armenia committed to double its forest cover by 2050. Is it a realistic goal?

— Whether it's realistic or not, it depends on us. I think that it's possible, but we have to use the upcoming 3-5 years for in-depth planning. We have to improve our technical capacities, educate a new generation of specialists, establish new nurseries, find funding, as well as measure the financial and economic effects. We discuss huge expenses but there will be economic benefits as well. Forest, after all, is a life-giving ecosystem and we have to save it.

DANIEL HAAS:

"BMZ Pays Particular Attention to Cross-Country Exchange"

Interview with Mr. Daniel Haas, the Head of German Development Cooperation in the South Caucasus.

INTERVIEW : AREG DAVTYAN / PHOTO : EMBASSY OF GEORGIA TO THE FEDERAL REPUBLIC OF GERMANY

The German Federal Ministry for Economic Cooperation and Development (BMZ) has active cooperation with the three countries of the South Caucasus – Armenia, Azerbaijan and Georgia. What is the frame and the main focus of this cooperation?

— BMZ cooperates with all three countries of the South Caucasus within the framework of the Caucasus Initiative of the German Federal Government. The three priority areas are sustainable economic development, good governance, and environmental protection.
All BMZ funded programmes have a regional perspective towards the three countries of the South Caucasus with activities adapted to the specific circumstances and needs of each country. This approach makes it possible to join forces, achieve real improvements, and maximize impact. At the same time, it opens the opportunity to integrate cross-border exchange at technical level, which we see as an essential component of each project and programme in order to establish connections between the countries that would otherwise not be possible due to the conflict in the region.
With commitments of about EUR 130 million over the last six years, Germany is currently the largest bilateral donor for environmental protection and natural resources management in the South Caucasus.

German Cooperation consists of the technical and the financial cooperation. What are the most important features that characterize each of the two approaches?

— Technical and financial cooperation are closely interlinked and have an impact on various levels. The technical

GERMANY IS CURRENTLY THE LARGEST BILATERAL DONOR FOR ENVIRONMENTAL PROTECTION AND NATURAL RESOURCES MANAGEMENT IN THE SOUTH CAUCASUS

cooperation projects are mainly implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, developing the capacities of individuals, organizations, and societies in partner countries. Financial cooperation projects are implemented by KfW Development Bank assisting with financing of development measures, by providing both grants and loans. We also work with and through other partners in the region, like WWF and the Caucasus Nature Fund (CNF), the latter having been set up through the support provided by the German government.

Environmental issues in the South Caucasus are one of the priority areas of the BMZ. Looking at the worlds' main challenges in the field of environment, what is the situation in the South Caucasus?

— In recent years, besides climate change, the loss of biodiversity has become one of the greatest global challenges. The report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reveals that around one million animal and plant species worldwide are threatened with extinction, and many of these will become extinct within the next few decades. This is an unprecedented rate in human history, which is driven by several environmental challenges such as habitat loss and degradation, climate change, pollution, overexploitation, and unsustainable use of natural resources. This trend is also visible in the South Caucasus, an area, which is considered to be one of the world's biodiversity "hotspots." Therefore, the countries of the South Caucasus have a great responsibility in conserving the unique biodiversity of their region. Rich biodiversity is vital for the economic opportunities of local communities in South Caucasus countries: agriculture, energy, water supply, and tourism are good examples. The rich flora and fauna also fulfill important functions for climate protection and help to adapt to the effects of climate change, which are increasingly noticeable. Just as on a global scale, all these valuable ecosystem services are at risk in this region as well. In all the three countries, there is enormous pressure on nature and natural resources, driven by poverty and unsustainable use of resources.

What are the key strategic goals of BMZ in the South Caucasus region for improving the environment and biodiversity?

— German Development Corporation has made a multi-year commitment to support the South Caucasus region's quest to find solutions to the mentioned problems and to pursue a development path that would meet the needs of the society while protecting the environment and biodiversity. Important global frameworks, such as the Sustainable Development Goals (SDGs) of the 2030 Agenda, the Paris Agreement on climate change, and the Convention on Biological Diversity (CBD) have been ratified by the three countries. We support the countries in implementing these commitments.
With support from the German government, a number of strategies and laws related to improved conservation of nature and biodiversity have been developed and are now being applied. In Armenia, the platform on sustainable pasture management has been established, which is a good example for intersectoral collaboration. Stakeholders from different ministries, universities, civil society organizations and communities come together to discuss relevant issues and work on joint strategies balancing diverging interests. In Georgia, we support the introduction of sustainable forest management practices, an important aspect for conserving biodiversity, as forests cover about 40% of Georgia's territory.
Environmental awareness raising among the population is a cross-cutting topic in all the three countries, which leads people to better understand the benefits of nature and consequently, use it in a sustainable way and protect it. We also assist in increasing energy efficiency and expanding renewable energy, e.g. by providing loans via commercial banks to finance energy-efficiency measures in private houses or to install solar devices and small hydropower plants.
Germany has been contributing to the development and proper management of protected areas in the South Caucasus for more than 20 years by providing infrastructure, special equipment, and modern management planning. Local communities must benefit from the protected areas. Therefore, our programmes promote sustainable agriculture and income-generating activities such as beekeeping and eco-tourism. To ensure the long-term functioning of the protected areas, we operate through a local partner, the Caucasus Nature Fund (CNF). Today, the CNF financially supports 18 protected areas covering an area of 550,000 ha (almost 1,236,000 acres). The CNF, set up as an endowment fund, is also a champion in terms of financial sustainability because its activities are largely financed by its own capital revenues.
It is a strategic interest of BMZ that more donors or philanthropic partners contribute to the fund, which creates

RICH BIODIVERSITY IS VITAL FOR THE ECONOMIC OPPORTUNITIES OF LOCAL COMMUNITIES IN SOUTH CAUCASUS COUNTRIES: AGRICULTURE, ENERGY, WATER SUPPLY, AND TOURISM ARE GOOD EXAMPLES

a unique return on investment – intact ecosystems and conservation of the invaluable wealth of the region's biological diversity for current and future generations.

How can German Development Cooperation contribute to regional cooperation and exchange taking into consideration the existing conflict?

— All BMZ supported programmes pay particular attention to cross-country exchange, which creates cooperative relationships and also promotes rapprochement between the countries. The South Caucasus comprises large ecosystems and habitats, which do not end at political borders. An example of transboundary cooperation is KfW's Eco-Corridor Programme: by connecting protected areas through eco-corridors, isolated populations of wild animals can migrate and thus prevent genetic degradation. And again, here as well, we work with and through the local communities where villagers are engaged in and directly profit from conservation activities both socially and economically.
In the framework of the technical cooperation programmes, regional conferences, training events, and joint study tours are organized providing the opportunity to exchange on topics like ecosystem services, erosion control, and sustainable forest and pasture management, among others. Such events are valuable opportunities to promote dialogue between the three countries, regardless of the existing conflict.

Finally, a personal question: what makes this region a special place for you?

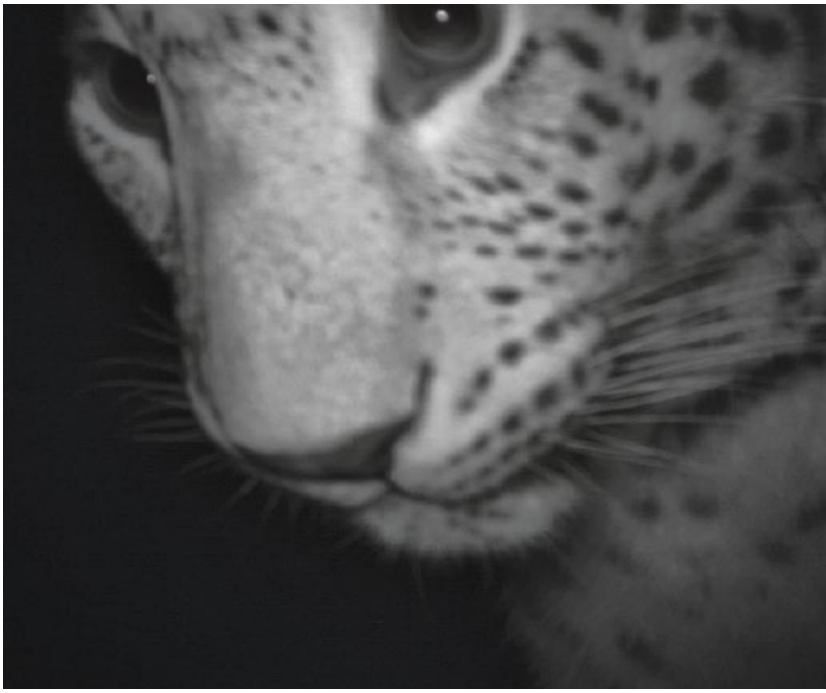
— As it happens to many diplomats, in our family, too, we quickly lost our hearts to the South Caucasus, its friendly people, and its diverse and ancient cultures. And, of course, the abundance of nature and the most impressive landscapes are part of the magic, which make the region a special place for me. It is a privilege to work here with committed partners and to join forces in order to preserve what has been borrowed by humanity. ◆

GREEN ISSUE:
THE NEW ECOLOGICAL IDENTITY OF ARMENIA

THE LEOPARD

The Mystical Beauty of the Armenian Highlands Returned

The King of the Armenian Highlands promenades around its kingdom, moving its giant paws, shifting from one leg to another. It soundlessly moves between the trees, listening to the whispers of the forest, leaving no trace of its presence. Very few people have encountered the animal from a close distance, as it chooses to stay away and live its life in privacy. Despite its secretive character, the Caucasian Leopard (*Panthera pardus ciscaucasica*), a native of these lands, has earned the respect to be named King of Armenian Highlands. In the late 90s, the King left the mountainous area of Armenia, turning into a legend of our elders. Only in recent years, however, the situation appears to have changed. The Leopard has been spotted at several sites around the country: marking its trails in the north, chasing its prey in the south. The mystical beauty, they say, has returned to breathe a new life into the Armenian highlands.



Zangezur Sanctuary

Caucasian Leopard caught on the hidden camera

TEXT : MARGARIT MIRZOYAN
PHOTO : WWF ARMENIA

Today, there are around ten individuals permanently inhabiting Armenia, while two decades ago there was no trace of the leopard. The experts named several reasons for its departure. The rise of poaching on leopard and its declining food base (particularly, bezoar goat and Armenian mouflon) were amongst them. Besides, protected areas available for its population in Armenia represented only 12% of its usual habitat. "The Caucasian Leopard is not a tiny animal to live in a small area; each leopard needs 5,000-20,000 hectares," says Dr. Karen Manvelyan, the Director of WWF Armenia. "Thus, it would be impossible to make the animal stay in this small area, there was a need to provide it with a new home." Having in mind this objective, since 2002, the large-scale project on Caucasian Leopard Conservation has been implemented, and the recent positive trend in the size of the population illustrates that the project has reached its primary goal. To celebrate the tangible results achieved, the RA Ministry of Environment declared 2019 the "Year of the Caucasian Leopard."

This initiative has a number of pillars. For the first time in 15 years, the leopard was captured on a camera trap from a close distance, which means that it has become more trustful and perceives the camera as something usual, like a tree or a stone. Also, as the number of the species of its prey in the country has increased, a need to raise public awareness has emerged.

The Leopards inhabit the central and eastern parts of Khosrov Forest Reserve southwards to the Armenian-Iranian state border, covering the Geghama, Zangezur, Vayots Dzor, Bargushat and Meghri ridges. The habitats of Leopard include arid mountain grasslands, arid sparse

THE LEOPARDS INHABIT THE CENTRAL AND EASTERN PARTS OF KHOSROV FOREST RESERVE SOUTHWARDS TO THE ARMENIAN-IRANIAN STATE BORDER

Khosrov Forest State Reserve
Leopard Neo's first photo

forests, mountain grasslands, subalpine and alpine meadows. The maximum possible number of Leopards in Armenia is 10-15 individuals. The extent of occurrence is 7497.2 km^2. The area of occupancy is 2856.8 km^2. The presence of Leopard is beneficial for the sustainability of the ecosystem. An animal at the top of the ecological pyramid keeps the dynamics of its prey species and makes the ecosystem functional and stable.

"To communicate these ideas to the broader public, the Ministry established a working group and initiated a number of events and activities. Press conferences, publications, and social clips are only a small portion of the planned operations," indicates Ms. Diana Yeritspokhyants, Assistant to the Deputy Minister of Environment. In February of 2019, a workshop on development of the National Action Plan for Conservation of Leopard in Armenia for 2020-2030 was organized by the RA Ministry of Environment and WWF in Vayk town. The Ministry of High-Tech Industry suggested creating a new postmark with the image of the animal. The Central Bank, in its turn, will release a commemorative coin called "The Year of the Caucasian Leopard." The central event of the initiative – the Caucasian Leopard Summit is set to happen in 2020 in Lori region, gathering experts and Government representatives from all the countries that have leopard populations. The guests of the summit will visit the Khosrov Reserve, and a declaration for mutual strategic cooperation on the matter will be signed.

Finally, the RA Ministry of Environment took the conservation of the animal to a higher level, introducing a new bill on the matter of poaching of the leopard. The draft law suggests increasing the previous 3 million AMD fine to 100 million AMD and sets a higher penalty of 500 million AMD for the hunt in specially protected areas.

THE RESEARCH IDENTIFIED THAT KHOSROV AND SHIKAHOGH RESERVES WERE THE ONLY PROTECTED AREAS SUITABLE FOR THE LIFE OF THE LEOPARD

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Back in 2002, when experts had just begun operating in the region, there was no hint about these developments. In that period, Dr. Victor Lukarevsky, a wildlife expert well-known for his work "Operation: Snow Tiger" was invited by WWF and with the local experts Mr. Alexander Malkhasyan and Dr. Igor Khorozyan made a survey on the identification of possible habitats of the Caucasian Leopard. They were the first specialists to place camera traps, and in 2005 they received the first images of the leopard. Unfortunately, the research identified that Khosrov and Shikahogh Reserves were the only protected areas suitable for the life of the leopard, representing only 12% of its historic habitat size. The further operations became a basis for one of the first projects of WWF Armenia, "The Conservation of the Caucasian Leopard" supported by WWF Germany and WWF Switzerland. Since 2002, WWF has been supporting the RA Ministry of Nature Protection (now RA Ministry of Environment) in planning and establishing new protected areas, to include more leopard habitats under protection and to promote the safety of the leopard and its prey species.

Finally, in 2009, Areviq National Park with an area of 34,401 ha and Zangezur state sanctuary with an area of 17,368 ha were established in Syunik under WWF/CEPF projects. In 2013, under a UNDP/GEF project and WWF co-financing, Khustup state sanctuary was established with an area of 6,947 ha, and Zangezur state sanctuary was expanded to 25,871 ha.

To promote safe migration of the leopard and species of prey, in 2015 WWF started a project on the creation of an eco-corridor in southern Armenia, which will connect protected areas in

Khosrov Forest State Reserve

Syunik region with the Khosrov Forest State Reserve. The project is funded by KfW, on behalf of BMZ. The main purpose of the project is the establishment of an eco-corridor via the creation of Community Conserved Areas for the protection and sustainable use of natural resources as well as for the migration of the leopard and some other large mammals. As of today, five Community Conserved Areas have been created by the Council Decisions of five communities, covering a total area of 61,000 ha. ›

To protect and to monitor biodiversity in Community Conserved Areas 20 caretakers from local communities are recruited and trained. WWF provided these people with all the necessary equipment, camera traps and off-road vehicles. These guardians also receive monthly salaries, which also addresses the lack of job opportunities in rural Armenia. Wildlife expert Mr. Alexander Malkhasyan works at these sites half of the year. In Ararat, Vayots Dzor, and Syunik regions, he monitors large ungulates and defines the main trails of the leopard with the rangers of the protected areas and caretakers of the Community Conserved Areas. Even though he has heard the roar of the Leopard, he has

Alexander Malkhasyan during field work

Khosrov Forest State Reserve

Zangezur Biosphere Complex, Areviq National Park

Noravank canyon in winter

never seen the animal closely and says that he does not believe that any one has. “There have been very few cases of actual encounter. Those who have really seen the animal, say that it won’t attack you but on the subconscious level, the form of the head and the spots arouse huge fear in them,” says Alexander.

BESIDES THE ENLARGEMENT OF ITS HABITAT, THE FOOD BASE OF THE CAUCASIAN LEOPARD – THE BEZOAR GOAT POPULATION – HAS ALSO INCREASED, REACHING MORE THAN 3000 INDIVIDUALS

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Recently the Caucasus Nature Fund (CNF) marked the 10th anniversary of its work in Armenia. In 2009 CNF began supporting the protected areas by covering operational costs and co-financing the state budget (including salary supplements, essential equipment, and maintenance of the PAs). CNF support has been crucial in enhancing the management effectiveness of the PAs particularly the conservation of the main habitats of the leopard (Areviq National Park, Khosrov Forest State Reserve, Gnishik Protected Landscape, etc.). “Today CNF not only contributes to the essential costs of PAs but also introduces new technologies to the PAs such as online cameras, drones, camera traps, and other. Thus, CNF significantly supports the protection of leopard’s habitats,” mentions Mr. Arman Vermishyan, Representative Office Director of CNF in Armenia.

Besides the enlargement of its habitat, the food base of the Caucasian leopard – the bezoar goat population – has also increased, reaching more than 3000 individuals, and this was another reason why the leopard came to stay. Previously, some male specimens would visit the country and then disappear, but now several reproducing couples have settled near the borders of Iran and Azerbaijan as well as Armenia and Azerbaijan. With regards to the latter, three leopard cubs were born at Zangezur Mountain Range. Then, after a year of silence, in 2018 a male cub leopard was photographed in Khosrov Forest State Reserve, the Northern habitat of the leopard. It was a huge surprise as the last leopards in that location were killed back in 1999. His name is Neo and he is three years old now. According to the WWF information, the cub was born in the border area between Armenia and Nakhijevan. His parents, Yeva and Aras, the latter having injured his leg at the border, were previously spotted on the territory of Armenia. Several other individuals were noticed in the south of the country, in Areviq National Park. People say, a female leopard has settled in Noravank Canyon (part of the Arpa Protected Landscape) and, from time to time, can be seen looking down at the Monastery.

Unfortunately, up to this day, there are many threats facing the Caucasian leopards, especially near the borders. The locals put traps and snares to catch a goat or a wild boar for hunting, and eventually, the leopards fall into these traps and get severe injuries. Since 2014, the situation at the border in Nakhijevan has worsened with new block posts and mines, and it has become very dangerous for the leopards to stroll in those areas; three leopards were seen with injured paws. To prevent similar cases, the experts and rangers work hard to detect these traps and remove them.

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Since ancient times, Armenians have honored feline family animals portraying them on historical engravings and dynasty emblems. Thus, the return of the animal home is not only of environmental but also of historical and cultural importance. “They have a secret life. They usually hunt at night or early in the morning to stay unnoticed. Foggy, snowy and rainy weather proves perfect for their activities,” says Alexander, “but the images from Khosrov Reserve illustrate that they have started moving around in the daytime as well.” This means that the animal feels safe in the Armenian mountains and, most likely, will stay here, at least in the near future.

BIRDS AND BUTTERFLIES:

INDICATORS OF ECOSYSTEM DYNAMICS

Birds and butterflies are vital indicators for the state of ecosystems and biodiversity. They are living reminders of how important it is to take care of our environment and how insignificant human borders are when it comes to nature. Soon Armenia will have its first bird and butterfly atlases, joining such projects as European Breeding Birds Atlas 2, for the successful conservation of the rich diversity of the species. The atlases will include hundreds of butterfly and breeding bird species flying over the mountains and valleys of Armenia.

TEXT : MARGARIT MIRZOYAN / PHOTO : TSE

The extended information analyzed and summarized in the atlas on prime butterfly areas, the potential threats to these areas, and the measures aimed at the elimination of these threats are available on the website of Butterfly Conservation Armenia (https://www.butterfly-conservation-armenia.org/), making the information accessible for all interested stakeholders.

The world "atlas" reminds me of the beautiful hardcover books that my grandfather used to show me when I was a child. The fascinating images of animals and plants were the only meaning these books could convey to me at the age of eight. When I recently came across the news that Armenia was about to publish its first atlases of birds and butterflies, I had the same feeling of fascination that I used to experience as a child, glancing through the colorful pages of the European or Asian atlases during the summer holidays at my grandfather's veranda. It turned out that atlases have a much more important application than highlighting the beauty of flora and fauna. Years of diligent data collection and monitoring lie at the core of each atlas, and the information collected can be used for a variety of purposes. For example, the first atlases in Armenia that will cover butterflies and breeding birds have a goal to introduce long-term, self-sustaining monitoring approaches, which can serve as a basis for identifying changes in the natural ecosystems. Indeed, way before the invention of innovative methods as early-warning systems for natural disasters, people would read the changes in the attitude of different animal and plant species to discover the dynamics in the ecosystems.
When working on this article, I was introduced to the Towards Sustainable Ecosystem (TSE) NGO – the organization behind the profound data collection on birds and butterflies. TSE has two branches involved in the project, Butterflies Conservation Armenia and Armenian Bird Census. In the framework of the environmental programme supported by GIZ, TSE undertook data analysis and development of atlases on butterflies and breeding birds, as essential milestones for biodiversity monitoring in Armenia, using the data collected up to this day. The robust, in-depth data collected and analyzed for the atlases directly benefit the government sector since reliable information is indispensable for efficient decision-making processes. It can also contribute to the formation of development strategies on conservation and management in the relevant sector.
During the interview, the Executive Director of the NGO, Dr. Karen Aghababyan highlighted that the creation of the "Atlas of Butterflies in Armenia," in particular, is based on an enormous amount of data and analysis.
On a more practical level, the atlas, which will be published soon, follows the universal scheme of all well-established atlases. The main section of the book is dedicated to the Species Accounts. Here all the necessary information about the species is compiled. Among other parts, the atlas has an Application section, which provides an overview of the practical use of data for the assessment of the condition of ecosystems. The authors managed to highlight the progress from simply collecting the information to the long-term monitoring of the species. Eventually, glancing through the atlas, one can witness how the data collected since 1874 have turned into a useful tool for tracking changes at the levels of species and ecosystems.
I was surprised to learn how much work it takes to assemble all the information for the atlases and how many professionals participated in making this knowledge available. Currently, TSE's Butterfly Conservation Armenia has 500 members and five permanent

Reed Bunting

Colias alfacariensis

THE AUTHORS MANAGED TO HIGHLIGHT THE PROGRESS FROM SIMPLY COLLECTING THE INFORMATION TO THE LONG-TERM MONITORING OF THE SPECIES

specialists, not to mention the numerous international experts. The network is planned to be enlarged to cover the entire territory of the country. Today, the data cover the butterfly species of the 50% of Armenia's land and the bird species of about 70% of the country.

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Currently, the Programme "Management of natural resources and safeguarding of ecosystem services for sustainable rural development in the South Caucasus" (ECOserve) supports the development of the "Atlas of the Breeding Birds in Armenia." The Armenian Bird Census branch of the TSE NGO has over 2600 members and a team of 10 permanent experts. Data collection started in 2003, and today the database consists of 300,000 records of 374 species, including 241 species of breeding birds. The data are being used for computation of species populations as well as are being transformed into graphs of population dynamics, and up-to-date maps of breeding birds in Armenia since 1990s. The process also caters to reviewing current bird conservation methods and could potentially lead to the development of new approaches. The format of the atlas will be similar to the one for butterflies. Information on species populations, dynamics, and habitats will be available. One section will introduce the conservation status of the species, as well as the existing and proposed conservation measures. Beyond the preparations for the publication of the "Atlas of the Breeding Birds in Armenia," the project is also preparing two workshops on the topics of biodiversity monitoring and ecosystem services provided by wildlife. The first workshop will be targeted at representatives of the state, NGOs, and tourism companies to highlight breeding birds' functions in sustainable and responsible ecotourism. It will touch upon topics such as citizen science and investment in innovative methods for cost-effective biodiversity monitoring. The second workshop will address the mainstreaming of biodiversity into other sectors. Participants from ministries, private companies, and NGOs will explore opportunities and win-win solutions of the sustainable co-existence of nature and economics.
During the project implementation, TSE has been successfully implementing measures on capacity building with businesses and community residents on environmentally friendly operations and living. The team of TSE NGO recognized the immense hunting threats to bird populations and initiated a campaign to raise awareness in different pilot communities of Dilijan, Urtsadzor, Areni, Arpi, and Meghri. Going beyond changing attitudes towards hunting birds, the NGO offered residents alternative ways of income by supporting them to become guides in protected areas and, thus, to preserve the birds rather than shoot them. Around ten people made use of this opportunity and now offer visitors wildlife tourism and show them the beauty of nature. Eventually, bird watching turned into a new source of revenue for these rural families. This is

› *Agriades dardanus*

⌄ Eurasian Bee-eater

just a small step that has the potential to lead to a more substantial transformation within these communities. In other words, the publication of these atlases can lead to further integration of butterfly and birdwatching in Armenia, eventually, turning it into a popular branch of ecotourism in the country.
The work on both bird and butterfly atlases also overlapped with the new publication period of the Armenian Red Book of Animals. The two processes are closely interlinked and can lead to the successful incorporation of data from the atlases into the Red Book.

White stork

Stonechat

The target group of the butterfly and bird atlases includes relevant ministries, universities, related research institutions, as well as public libraries. The audience also includes businesses working in the ecotourism sector and international organizations. The atlases can be used for studying and monitoring of vital species and can also become a solid basis for further development of monitoring methodology to be used by the Government. The content is relevant for school programmes, and the atlases can serve as a foundation for teaching materials at educational institutions.
The data collected can also be used by both private and non-profit sectors, enabling various companies to implement environmental assessments. Another important fact is that the Breeding Birds Atlas, in particular, will contribute to the pan-European initiative of the European Breeding Bird Atlas 2, demonstrating the in-depth data on bird species and their habitats at the national level. Bird monitoring has been designed and implemented in all parts of the world both in developed countries such as Europe, US, Canada, Australia, and New Zealand and in developing countries. This is due to the fact that birds are considered as a vital indicator of ecosystem changes, and their monitoring is a cost-effective, early-warning solution, with thousands of citizen scientists actively involved in the process of data collection.
After all, for me, the role of atlases transformed from being merely a book with mesmerizing images to a treasure, able to positively influence different people. My other interviewee, Dr. Astghik Danielyan, Adviser at GIZ Armenia, mentioned that when working on the atlas the team came up with names for some of those butterfly species, which did not have any. This means that these atlases have gone beyond their hardcovers, turning its content into scientific discovery. As a result, when reading the atlas, we uncover a new world, one page at a time and when putting the book aside, our imagination is filled with fascinating colors of butterfly wings and alluring bird songs.

THE ATLASES CAN BE USED FOR STUDYING AND MONITORING OF VITAL SPECIES AND CAN ALSO BECOME A SOLID BASIS FOR FURTHER DEVELOPMENT OF MONITORING METHODOLOGY TO BE USED BY THE GOVERNMENT

PRACTICAL APPROACHES FOR ENVIRONMENTAL AWARENESS-RAISING AND EDUCATION TO PROTECT ARMENIA'S RICH BIODIVERSITY

Practical approaches for environmental awareness-raising and education are critical nowadays, as, more than ever, it is vital for people to acknowledge the importance of biodiversity, as well as to learn about the various ways of protecting it. Biodiversity conservation can only be achieved if people acquire knowledge and motivation, engagement and responsibility needed to protect the natural resources. The awareness-raising of the public can be increased with the help of such practical tools as digital applications, social spots, educational movies, and engaging mini-campaigns. Taking this into consideration, the RA Ministry of Environment jointly with GIZ recently launched an environmental awareness-raising campaign in Armenia, which included mass media, presentations and screenings, talks, exhibitions, and other interactive techniques, addressing the public. In the framework of the campaign, visualized and practical approaches were effectively used to clearly show the importance of biodiversity, such as rare and threatened plant and animal species, and of nature protection in general.

TEXT : IBiS / PHOTO : GIZ

One of the key elements of the campaign: raising awareness through education

Biodiversity in Armenia is very rich with exceptionally high rate of endemism. This is explained by the country's location at the junction of three biogeographic zones (the Lesser Caucasus, Iranian, and Mediterranean zones), a broad altitude variation (from 375 to 4090 m above sea level), and the presence of ten distinct landscape-climatic zones in a relatively compact area. All the main natural ecosystems of the Caucasus are represented in Armenia except the humid subtropical zone. Every part of this mountainous area is home for unique species of animals and plants. To conserve these unique ecosystems, there is a need for societal outreach beyond regular PR campaigns.

In the framework of the Programme "Integrated Biodiversity Management in the South Caucasus" (IBiS), multi-dimensional campaigning has been introduced, which targets broader audience to cover various topics related to forests and other ecosystems. A forest movie and three spots related to forests were filmed to show the importance of forests and how to effectively use forest resources without harming them. The Green Bus mini-campaign was a successful component of the overall campaign. It travelled around Armenia stopping in the regions of Aragatsotn and Shirak, and actively engaging school children into environmental seminars on Armenia's biodiversity, endan-

A FOREST MOVIE AND THREE SPOTS RELATED TO FORESTS WERE FILMED TO SHOW THE IMPORTANCE OF FORESTS AND HOW TO EFFECTIVELY USE FOREST RESOURCES WITHOUT HARMING THEM. THE GREEN BUS MINI-CAMPAIGN WAS A SUCCESSFUL COMPONENT OF THE OVERALL CAMPAIGN

Community school teachers were trained to develop their knowledge and environmental teaching skills

THE RED BOOK APPLICATION IS A USER-FRIENDLY RESOURCE WITH ITS TARGET AUDIENCE BEING MOBILE PHONE USERS INCLUDING STUDENTS OF ALL AGES, THEIR PARENTS AND EDUCATORS, OTHER COMMUNITY MEMBERS, AND FOREIGN VISITORS

gered species, waste management, forests, nurseries, and other related topics with a strong focus on outdoor activities and practical games. It is important to mention that prior to the bus tour, community school teachers, within the Green Bus mini campaign, were trained to develop their knowledge and environmental teaching skills for further use in the classrooms, and the teachers' manuals were reprinted.

In 2010, the updated Red Book was approved by the Government of the Republic of Armenia and was given legal status. Criteria of IUCN Red List of Threatened Species served as a basis for the assessment conducted for the Red Book. The Red Book of Armenia comprises the lists of rare and threatened plant and animal species and, thereby, aims at the preservation and recovery of the country's rich biodiversity.

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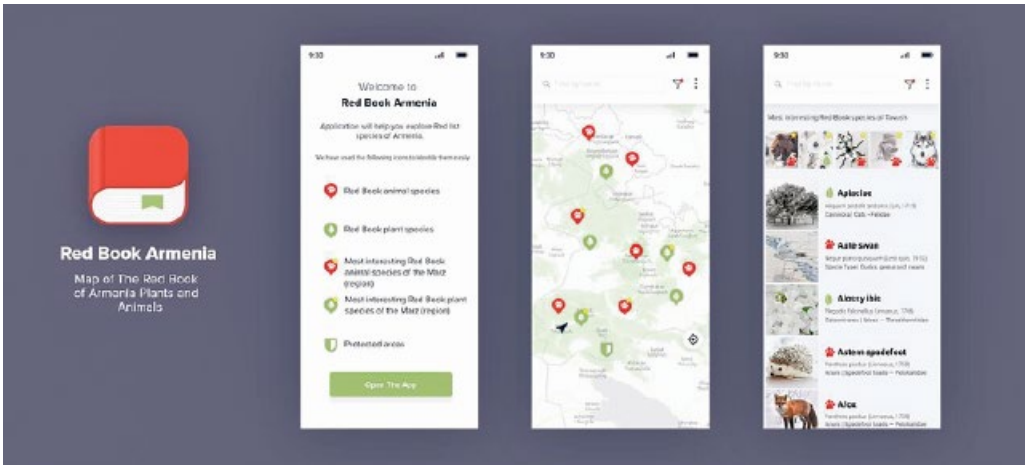
The Red Book mobile application, another highlight of the overall campaign,

Red Book Armenia
application interface



The Red Book presents rare, disappeared, declining, or uncertain-status species of animals and plants. The first edition of the Red Book of Animals of RA, published in 1987, included features of each species, its quantity trends, distribution areas, and morphology. In the 2010 edition of the book, 308 species of animals were included. The Red Book of Plants of RA, designed in 1989, has a similar structure. The latest edition of the book (also published in 2010), was based on 2007 data on around 452 plants and 40 mushroom descriptions, and separately listed 223 species of plants with concerning status or trends.

aims at raising public awareness of the endangered species and averting their extinction. The mobile application, unlike the hardcopy version of the Red Book, gives everyone direct, instantaneous access to all species recognized in endangered status with the possibility to quickly filter them out according to their types and/or geographic location at Marz level. The Red Book application is a user-friendly resource with its target audience being mobile phone users including students of all ages, their parents and educators, other community members, and foreign visitors.

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Based on the device's GPS coordinates, the app displays icons indicating the nearby protected areas and the species of animals and plants. All the essential information, including pictures, are only a touch away. It works offline as well, which makes it usable in the wilderness with no internet access. To make the experience even more satisfying, the application has a feedback feature and a questionnaire. Since ensuring the safe exploration of endangered species and their habitats is the ultimate goal of the application, the exact coordinates of the species abundance were altered. The administrative component of the app is dynamic, and the RA Ministry of Environment can add new species or edit the existing information as needed. The application can be on a par with other biodiversity related online games and mobile apps since it appeals to the user's natural curiosity, is easy to use and has a friendly, intuitive user interface.

SAFEGUARDING THE RICH BIODIVERSITY AND ECOSYSTEM SERVICES OF PASTURES AND GRASSLANDS OF ARMENIA

Armenia is one of the world's renowned biodiversity hotspots. A huge part of that rich biodiversity is within the pasture and grassland ecosystems. Besides the provision of fodder for livestock, pasture and grassland ecosystems also provide a variety of other services, such as regulation of terrestrial water cycle, maintenance of soil productivity and carbon storage, provision of edible plants, medicinal herbs, etc.

TEXT : IBiS / PHOTO : GIZ

In Armenia, 70% of the rural population earn their living from agriculture. With natural fodder areas constituting around half of the country's agricultural land, livestock keeping is the main agricultural activity, and pastoralist grazing has a long tradition. For the rural households in the Armenian highlands the production of meat and dairy products is not only an important income source, but also an integral part of the daily diet. At the same time, natural fodder areas are highly valuable in terms of biodiversity. On a global level, Armenia is a vital center of origin of agrobiodiversity and endemism of wild relatives of cultivated plants. Being rich with the latter, the natural fodder areas are also an important constituent of the country's agricultural biodiversity. Besides fodder for livestock, pasture ecosystems also provide a variety of other ecosystem services. They are essential to the terrestrial water cycle, maintenance of soil productivity, and elimination of the risk of soil erosion as well as natural hazards and disasters. The loss of these multidimensional biomes would mean loss of their rich biodiversity and decrease of services they provide. Despite the significance of natural fodder areas, they are increasingly endangered because of degrada-

35% of the territory and 59% of the total agricultural land in Armenia represent natural forage lands.

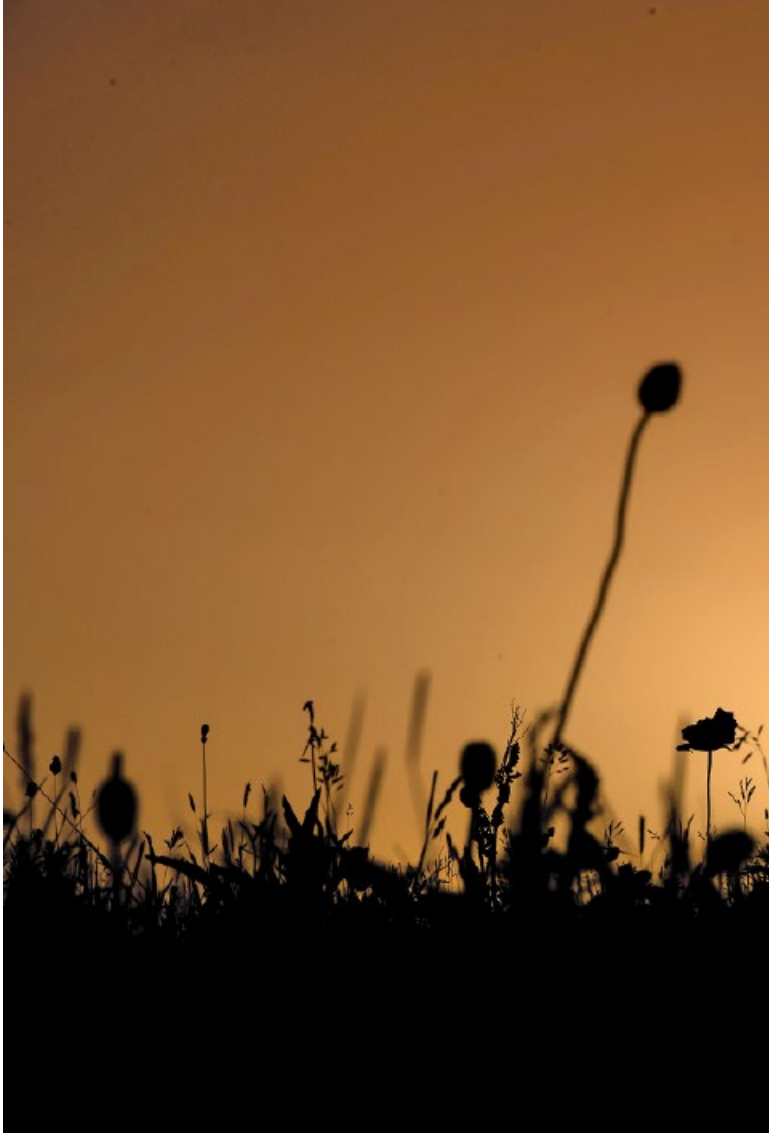
tion processes. The main causes are inappropriate pasture management practices. Pastures and grasslands are identified as one of those ecosystems in the world that are most affected by degradation and biodiversity loss.

Recognizing the need to build local capacities and to provide appropriate methods and tools for improved pasture management, GIZ, together with its key partners, including the RA Ministry of Territorial Administration and Development (now RA Ministry of Territorial Administration and Infrastructure), RA Ministry of Agriculture (now RA Ministry of Economy) and the Strategic Development Agency (SDA), has been promoting sustainable use and management of pasture and grassland ecosystems in the framework of environmental programmes since 2012.

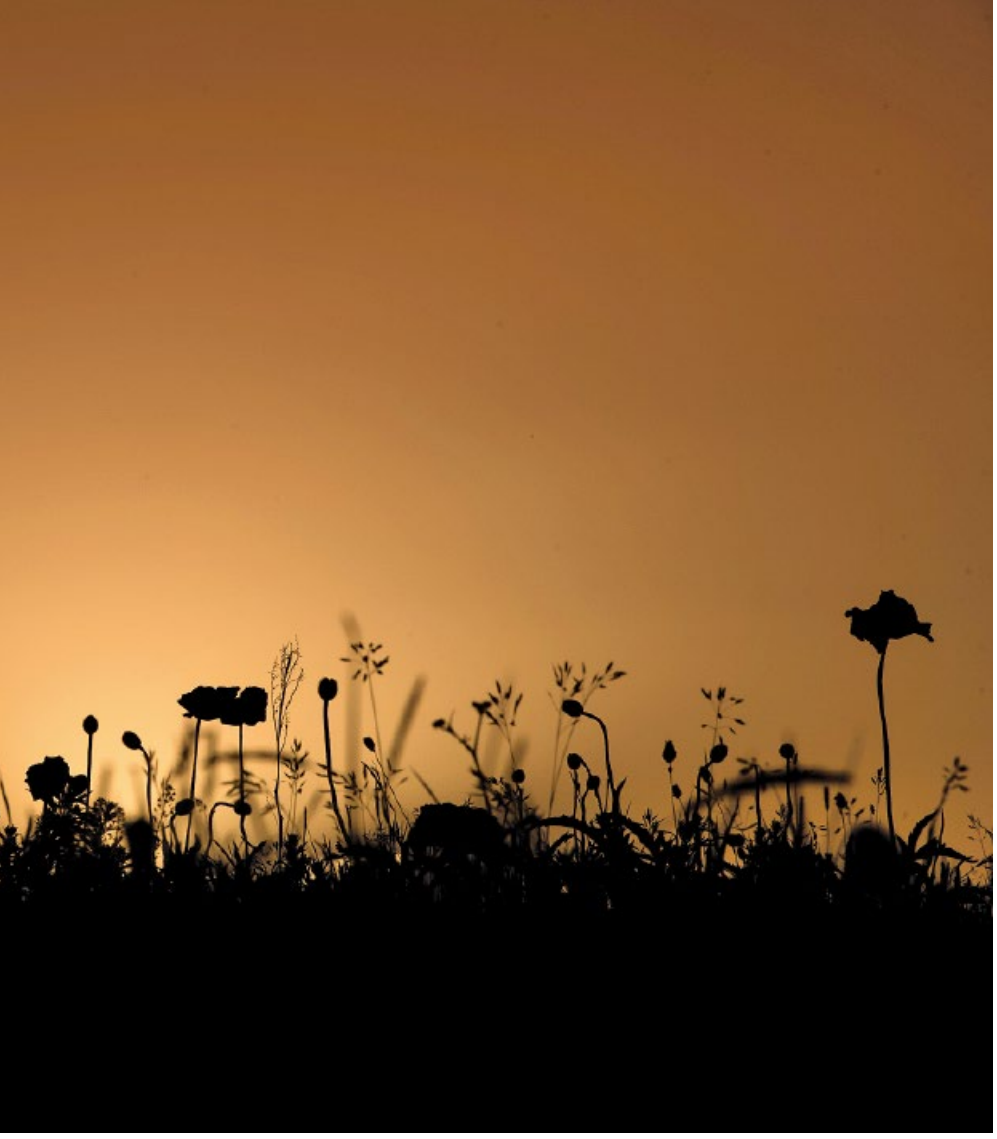
In this context, a toolbox for the monitoring and sustainable management of natural fodder areas suitable for the Armenian context has been developed by the environmental programme supported by GIZ. A Manual for Monitoring of Pastures has been elaborated allowing to analyze local pasture conditions for developing and evaluating management mechanisms. The Guidelines for the Development and Implementation of Sustainable Management Plans for Pastures and Grasslands provide instructions for elaborating community-based pasture management systems. Based on these, the pilot communities in the regions of Syunik and Tavush started to implement monitoring of pasture conditions and developed community pasture management plans, including rotation schemes. Due to these sustainable pasture management practices, the diary and meat production increased in the pilot communities leading to an average growth of farmers' income.

Nevertheless, the community-adjacent pastures often reach a level of degradation where natural rehabilitation by rotation is no longer effective. Community representatives mentioned that they lack the know-how for improving these sites. In response to this issue, the practice-oriented Guidelines for the Rehabilitation of Degraded Natural Fodder Areas (Pastures and Grasslands) of Armenia have been developed. The purpose of developing the Guidelines was to provide a standardized and comprehensive practical instrument for rehabilitating degraded natural fodder areas in Armenia. Accordingly, the programme has carried out a comprehensive

piloting of the Guidelines to test their validity in Aragatsotn, Shirak and Syunik regions of Armenia targeting different landscapes and different types of degradation.
Together with the local working groups the results of the rehabilitation activities in all pilot sites have been assessed. In one year, the vegetation cover on rehabilitation sites improved by 29-77% compared to the baseline. Particularly, high-quality edible forage plants showed a clear increase, and their content almost doubled in some sites. An analysis of the plant communities also indicated increased plant biodiversity in these areas.
Representatives of the pilot communities emphasize that the combination of rehabilitation measures and pasture management plans has led to positive results and improved fodder quality. The coordinated pasture management has also changed the people's mind-set. The local population starts to understand that the overgrazing of pasture areas can lead to negative ecological impact, and that sustainable pasture management is necessary. In various ways, participation, cooperation and coordination have been the driving forces of success of the pilot projects on sustainable pasture management and rehabilitation. On the one hand, active participation of the community stakeholders in the decision-making and coordination of the local intervention has been crucial. This approach also helped to build capacities within the communities, which is valuable for developing future community-based projects.
The above-mentioned toolkits, jointly developed, tested and approved by the correspondent local partners, are now widely used in Armenia. The toolkit is thus an important con-



Pasture rehabilitation
activities: before and after



Platform members and associates: RA Ministry of Economy, RA Ministry of Territorial Administration and Infrastructure, RA Ministry of Environment, CARMAC project powered by the World Bank, SDA, GIZ, UNDP's "Sustainable Management of Lands and Forests in North Armenia Mountainous Landscapes" project, Center for Agribusiness and Rural Development (CARD) Foundation, Environmental Law Resource Center of YSU, Armenian Territorial Development Fund (ATDF), Armenian National Agrarian University, and others.

Pastures and grasslands provide around 75% of the food supply for the livestock sector.

tribution to establishing a common participatory approach in the sector of sustainable pasture management, which was characterized by a diversity of different and not harmonized methodologies in the past.

Owing to the improved natural fodder base, pilot communities produce increasing amounts of high quality milk. However, because of the remote, mountainous location of the communities and the limited access to adequate markets, the improved milk production has not translated into increased economic benefits for the farmers.

Seyran Arakelyan from Brnakot settlement runs one of the few milk processing companies in the area that focuses on using locally produced milk, providing a steady income to few nearby supplying farmers. The company had identified the economic opportunity of catering to the increasing demand for high value dairy and cheese products. Thus, in order to increase competitiveness, the company, with GIZ support, obtained a pasteurization machine, which is indispensable for meeting quality and safety standards for dairy products. In addition, the company made its main investments into upgrading the production, administrative and storage areas. With the improvements, the company has considerably increased its sales of high value products and has even entered the international market, increasing its demand for locally produced milk. The higher and more stable incomes provide an incentive for farmers to continue and extend the sustainable management of local pastures.

Besides IBiS, there have been numerous programmes and projects in Armenia working on pasture management in recent years. The need to strengthen cooperation and ties within the sector at national level has been repeatedly highlighted by many stakeholders during relevant conferences and meetings. Based on their long-term cooperation, GIZ, the Sustainable Development Agency NGO (SDA), and the Community Agricultural Resource Management and Competitiveness project (CARMAC II) initiated discussions on developing a national coordination platform on pasture management. In July 2018, the Coordination Platform for Sustainable Management of RA's Natural Fodder Areas: Pastures and Grasslands has been established. The members of the platform coordinate relevant programmes and projects, exchange experiences, implement joint projects, and formulate strategies. The fact that under the umbrella of the platform different stakeholders come together can be considered as a big step towards more coordinated efforts of improving the natural and economic conditions of Armenian forage lands. ◆

INTEGRATED EROSION CONTROL:

COMMUNITY OWNERSHIP AS A KEY FOR SUCCESS

Soil is one of the most important components of the ecosystems on earth. It plays a major role in determining the distribution of natural vegetation, crops, and even human settlements. Healthy and fertile soil contributes to nearly all aspects of human life - from food production to climate regulation. In Armenia, soil erosion might not seem a top priority issue, especially in rural areas where the residents have to cope with socio-economic challenges on a daily basis. However, the maintenance of good soil quality can play a large role in food security and the livelihoods of people as well as the proper functioning of ecosystem services.

TEXT : IBiS / PHOTO : GIZ

Soil erosion – the process of mobilization and displacement of soil particles – is the most visible effect of land degradation. Water erosion and wind erosion are the most important types of soil erosion.

In the framework of the IBiS programme, the Integrated Erosion Control (IEC) component, co-financed by the Austrian Development Agency (ADA), addressed these challenges on different levels. Showcasing integrated erosion control measures in high-risk mountain areas, influencing national policies and regulations for sustainable land use help the country to meet its obligations under the United Nations Convention to Combat Desertification (UNCCD) and the United Nations Convention on Biological Diversity (UNCBD).

Ten communities were selected in Aragatsotn and Shirak regions for the implementation of local erosion control measures, such as afforestation and bioengineering. Among the important criteria for the selection of the sites were not only the technical dimensions related to the degree of degradation and soil characteristics but also the interest of the communities and their willingness to contribute. The sense of ownership and active engagement of local self-government bodies as well as community members turned out to be key factors of success in preventing land degradation. Thereby, it is very important to identify the “change agents” in the community who are able to take up good initiatives, set good examples, mobilize and influence their peers, and inspire positive change.

The territorial reform and the subsequent enlargement of the communities presented another challenge for the whole work. Some pilot communities became settlements within consolidated communities, and the former local self-government bodies were no longer in charge. However, the territorial reform also brought new opportunities. For example, in Aparan, the project started working with the municipality and could thus bring the ideas and proposals on sustainable land management to a larger number of settlements, resulting in wider impact.

With regards to afforestation, representatives of regional administration, local self-government bodies, national and international experts, and community members jointly assessed and selected potential sites for afforestation, following an agreed set of criteria. Of course, tree planting is a long-term process. In order to generate some short-term benefits

for the community members, some fruit trees and berries were included in the planting schemes. In the framework of the project, approx. 650.000 tree seedlings were planted in small units on a total area of 200 ha. About 37 km of fence were built to protect the plantations. The work was implemented by around 420 local residents, including men and women, as well as youth. This is one of the first examples of community afforestation in Armenia. Considering the Government's ambition to increase Armenia's forest cover, such experiences provide important lessons learned. As far as the bio-engineering measures are concerned, the main objective was to support the rehabilitation of vegetation cover on degraded areas. Electric fencing was applied to prevent the grazing animals from entering the bioengineering sites.
Bioengineering measures proved to provide positive effects on vegetation cover already after one year.

Raising awareness and capacities on sustainable land management practices at different levels is considered a key success factor. Within the scope of IBiS, the Handbook on Integrated Erosion Control was developed, tailored specifically to the case of Armenia (available at https://biodivers-southcaucasus.org/uploads/files/5b6d79708896a.pdf). It provides concrete information on the activities and results achieved on the ground and gives step by step instructions on integrated erosion control for training institutions, farmers and local self-government bodies. Besides practical tips and tricks, the book also provides in-depth information on the different forms of erosion, the soil conditions in Armenia, and important aspects to consider for extending the practical measures to other parts of the country. Some of the methods and approaches are already replicated in other parts of Armenia.
Finally, a regional conference on Integrated Erosion Control was organized in Kazbegi, Georgia on October 2018. The conference was initiated by the IBiS programme in partnership with the UNCCD and the Regional Environmental Center for the Caucasus (REC Caucasus). The conference, with about 80 participants, was mainly aimed at the representatives of state and civil society institutions of the three countries of the South Caucasus – Armenia, Azerbaijan, and Georgia. Contributions by selected international participants also allowed for input beyond the regional scope of the South Caucasus – such as the mountainous regions of Central Asia and the Himalayas. The aim of the conference was the regional exchange of knowledge and experience on sustainable land management and the development of strategies for expanding the implemented pilot measures even further. Land degradation was identified as an important challenge in the South Caucasus. The conference provided an opportunity to clearly connect practical measures and actions on the ground with the global agenda, such as the respective UN Conventions and the Sustainable Development Goals. ◆

Soil bioengineering is the use of living plant materials to construct structures that perform some engineering functions. For this purpose, locally available materials are usually used that increase surface stability, control erosion, and protect the soil.

SEVAMOD PROJECT:

Predicting the Future Development of Lake Sevan

One of the three great seas of historic Armenia, Lake Sevan is a unique high-altitude freshwater lake, the most important natural resource and national treasure of present-day Armenia. While largely important from ecological, economic, and cultural perspectives, Sevan had been taken for granted and mercilessly exploited for many decades. The alarming trend of water level reduction forced the authorities to partially redirect two of the nearby rivers to the lake through tunnel projects in 1981 and 2004. Level stabilization alone, however, could not prevent continued ecological deterioration of the Lake Sevan. In July of 2018, an excessive algal bloom caused greenish discoloration of Sevan waters, alerting experts of yet another serious problem with water quality. The SevaMod project was initiated with a vision to provide solid, scientifically substantiated solution to this issue. We talked to the SevaMod project coordinator, German scientist Dr. Martin Schultze about the project, its initial results, and future outlook.

TEXT : IBiS / PHOTO : UFZ

THE WORLD BEGAN TO REALIZE THAT WE CANNOT ONLY MAKE USE OF NATURAL RESOURCES, BUT WE ALSO HAVE TO TAKE CARE OF THEM, SO THAT THE GENERATIONS TO FOLLOW WILL HAVE A CHANCE TO EXPERIENCE IT

The Project "Development of a Model for Lake Sevan for the Improvement of the Understanding of its Ecology and as Instrument for the Sustainable Management and Use of its Natural Resources" (SevaMod) was operated from June 2017 to May 2019 by the Helmholtz Centre for Environmental Research – UFZ in partnership with the Institute of Hydroecology and Ichthyology of the National Academy of Sciences of RA and the Environmental Monitoring and Information Center of the Ministry of Nature Protection of RA (now Ministry of Environment). The project consisted of several components, but the core idea was to develop a long-term scientific instrument able to predict water quality dynamics for management purposes so that the bodies responsible for the lake management could make decisions based on scientific data. "The world began to realize that we cannot only make use of natural resources, but we also have to take care of them, so that the generations to follow will have a chance to experience it," says Dr. Schultze.

Measurements in sediment core

Thermistor chain ready for implementation

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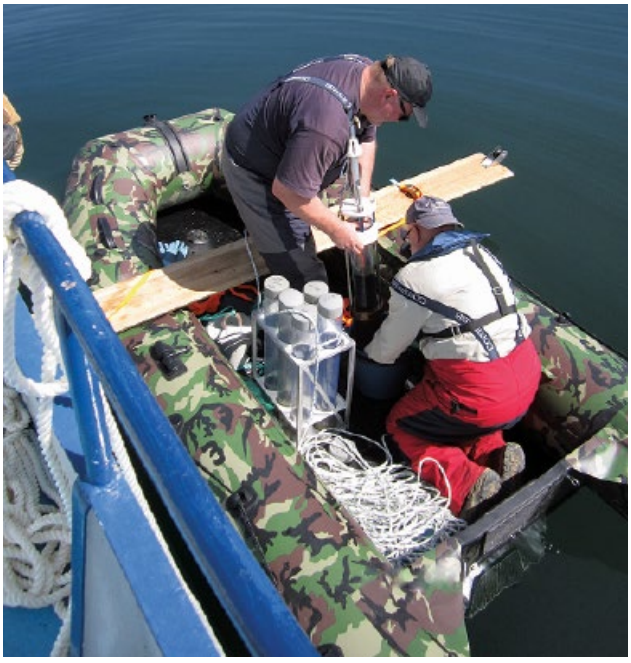
After the initial surveys by the German scientists, year-round monitoring of water quality started through the monthly sampling of Lake Sevan waters. Temperature and oxygen concentration sensors were placed in the lake. These operations brought much deeper insight and understanding of the temporal and spatial dynamics of the lake's physics and chemistry. The implementing team collaborated with the regional players, the administration of Sevan National Park and the Foundation for Restoration of Sevan Trout Stocks and Development for Aquaculture. The representatives of various EU projects, state officials, and the Embassy of the Federal Republic of Germany in Armenia also largely supported the project.

To build up the limnological characterization of Lake Sevan, the SevaMod project started with developing a one-dimensional (1D) physical model for Lake Sevan, which would describe the surface stratification and mixing processes of the lake, including heat distribution in both Big Sevan, which has a relatively shallow maximum depth of 35 meters, and the Small Sevan, which reaches down to 80 meters. The vertical temperature distribution is especially important in summer months due to the heating at the surface and insufficient exchange between shallow and deep layers resulting in a stable density stratification that prevents exchange between bottom and surface waters. ›



Taking sediment cores

THE RESIDENCE TIME, WHICH IS TIME TO EXCHANGE ALL THE WATER IN SEVAN, IS IN THE RANGE OF 25-40 YEARS, WHICH MEANS THAT IT NEEDS MUCH LONGER THAN LAKE CONSTANCE TO GET RID OF ITS "BAD MATTERS"

In science terms, this phenomenon is called thermal stratification, or layering. The warmer water, which is lighter, stays above the heavier colder water. Absence of substantial circulation and mixing prevents replenishment of deeper layers with much-needed oxygen, and all the organisms living there have to survive with the amount of oxygen that remains since the previous period of uniform temperatures and circulation. The sedimentation is another natural process correlated with stratification. Anything that enters the lake and grows or dies there eventually falls to the bottom and undergoes decay mediated by bacteria. As long as there is enough oxygen at the sediment-water interface, only a small flux of phosphorus, which is released by mineralization, gets back into the water body. Once the oxygen is depleted, large amounts of absorbed phosphorus are released from the sediment due to reductive conditions and spread into the whole water body when mixing resumes in winter. In the next spring, these nutrients induce massive growth in the well-lit surface waters and cause what is called algal blooming.
Theoretically, a three-dimensional (3D) model of the lake basin would collect much more information, but it would be exceedingly complex, resource-intensive, and very difficult to manage and sustain. Therefore, a 1D model was pursued since it would provide sufficiently reliable data, gain understanding and guide lake management in the right direction while fitting within the budget, timeframe, and scope of SevaMod. This model is also the cornerstone of providing projections for the effects of climate warming on Lake Sevan.
In support of the project, the Armenian partners collected all available water quality data from previous studies and state monitoring archives to understand longer-term trends observed before, and to assure the project team of the applicability of scientific approaches commonly used for other lakes. Another important step was the examination of samples of Lake Sevan sediment. None of the prior research projects focused on the concentration and the geochemical form of phosphorus in the sediments. Thus, the SevaMod team took Lake Sevan research to a new level never attained before and collected new data that can be used today but will also serve as a baseline for future comparisons. In Dr. Schultze's words, "Our task is not only to do good science but to develop applicable solutions which can be transformed into technical and political actions to manage natural resources."

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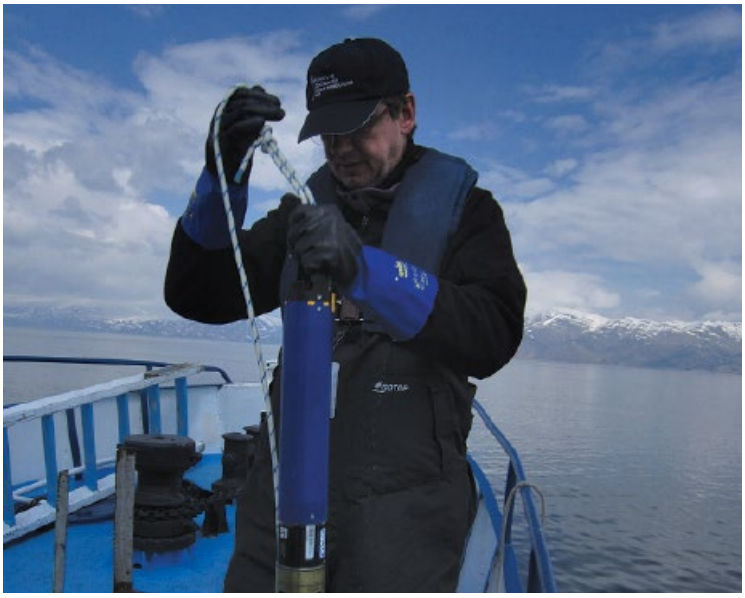
After preliminary analysis, the results of the Lake Sevan health assessment are concerning. Last July, when the bloom in the lake was quite extensive, a simple "white disk" test was carried out to quantify the general water quality of the lake. A white disk is lowered into the lake to the depth where it is no longer visible. In contrast to clear water that offers 10-meter visibility, surface waters of Lake Sevan allowed visibility at only 4.5-2.5 meters, which is considered problematic. During our interview, Dr. Schultze brought the example of Lake Constance in Germany, which is similar to Lake Sevan in size and had also experienced excessive amounts of phosphorus. A lake restoration programme implemented by the German, Swiss and Austrian governments in the 1970s took about 25 years to return the lake to its original condition. The volume of Lake Constance is naturally exchanged every five years by the inflow of rivers, but it takes three times longer to wash out all the phosphorus and all other contaminants. The residence time, which is time to exchange all the water in Sevan, is in the range of 25-40 years, which means that it needs much longer than Lake Constance to get rid of its "bad matters." If the interpretations of the SevaMod project scientists are right, it may take over 125 years to restore water quality if



Measuring with multi parameter probe

Lake Sevan is turned into a fully polluted system; this is why it is crucial to have a good understanding of how to manage the lake successfully and to make predictions for a long run.
"To implement new tools to predict the future development of Lake Sevan, i.e. a fully coupled physical-ecological lake model, will be an effective instrument but not the only one," Dr. Schultze says, "We need not only good technical approaches developed by scientists and engineers for solving or avoiding problems but we also need the right legislative framework and the acceptance of the local people. Otherwise, we will not be able to implement developed technical measures. In that sense, we want to contribute one piece of the system that is needed: developing a model that can reliably predict the development of Lake Sevan."

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The SevaMod team is working on manuscripts of a special issue of an international scientific journal focusing primarily on Lake Sevan. The scientists plan to have the edition in print by the end of 2019. They already received positive feedback from several journals that are interested in publishing such a special issue. The majority of previous publications on Lake Sevan by Armenian and Soviet scientists were in Russian, remaining largely unknown to the international limnological community. The expected special issue will make Lake Sevan data available to all specialists around the globe. However, the team does not mean to wait until the data are published. In late April, a one-day workshop was organized for specialists and officials responsible for Lake Sevan management. The event was highly successful as it communicated scientific data and forecasts and resulted in continued constructive discussions on the issue.

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The coordinator of the project Martin Schultze indicated that the currently developed physical model is only a basic component of a complex model necessary for the sustainable development of the lake. The future model should be able to simulate the ecological behavior of the lake depending on all foreseeable circumstances. However, such an undertaking is well beyond the scope of SevaMod project. Should SevaMod continue into another phase, it would implement more sophisticated monitoring to populate the model with the appropriate amount and types of data. Dr. Schultze says, "We need to be sure that the instrument we are constructing and plan to hand over to the managers is beneficial and not misleading and thus resulting in wrong decisions. Otherwise, it will be irresponsible."
The project gets funding in its second phase, and it is planned to develop the ecological part of the model and also design a 3D physical lake model of Sevan reflecting the lake basin in detail and showing local details of mixing processes. The 3D model will enable to quantify the influence of the lake's large size and the complicated bottom, as it can only be accomplished via comparing the monitoring results with the simulation. However, at this stage, the team will provide the 1D model of the lake and the results of the sediment investigation, as well as the summary and evaluation of the existing data. ◆

SHAPE OF WATER

USAID and the Urban Foundation started the Participatory Utilization and Resource Efficiency of Water (PURE Water) project to help Armenia not to lose one of its biggest natural treasures.

TEXT : ARTAVAZD YEGHIAZARYAN

July 28, 2019. It's a hot summer day in Armenia, around 35C. But people are not hiding from the sun; actually, streets and parks and squares are full of kids, youngsters and elders. Many of them are clothed as if on the beach, and most of them are totally wet. And if you appear to walk by and be noticed being dry, just wait a second and a bucket of water will be poured on you. But don't panic – it's not an act of terrorism; it's the most funny and popular national festival day – Vardavar – which originated thousands of years ago, during pagan times, as a way to worship water. It takes place each July and brings joy to thousands of people. But do we really understand the value of water, or do we take it for granted? This year, the joyful festival took a bit different tone in one of the regional communities of Armenia. Members of the Urban Foundation decided to use this national fest to make people understand that we need to care about water so it would care about us.

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Educational Vardavar is only one of the numerous activities the Urban Foundation and partners are implementing in the framework of the USAID funded PURE-Water project which aims to promote resource efficiency and participatory utilization of water particularly targeting groundwater resources of Ararat Valley. Earlier this year, within another initiative, the PURE-Water project solicited water saving ideas from young citizens with a scientific mindset. The Selection Committee (SelCom) was established for assessing the proposals submitted by scientist citizens.

Vardavar holiday celebrations in Armenia

One of the selection criteria of the competition was that proposals should be elaborated jointly with representatives of the communities involved in PURE-Water project to ensure their relevance to local needs. One of the winning projects was about the famous Armenian drinking water fountains – pulpulaks: the idea was to create an app to make the information about the location of these fountains accessible for tourists so that plastic bottles are reduced. Another project establishes water metering devices on irrigation canals, the other one installs garbage traps on them. The interactive website created for the Water Users Association helps farmers to follow if water is supplied to their plots in due time and quantity. The PURE-Water project Chief of Party Armen Varosyan says, "By engaging citizens in various activities we raise their awareness about waning water resources and urge them to become responsible water users. In other words, we urge them to think of their own way of saving precious water."

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The Ararat Valley is feeding Armenia: it makes up 4% of Armenia's total land area, and yet it yields 40% of Armenia's agricultural production. This shows how important these lands are

for the country and how catastrophic the lack of water resources may be. Ararat Valley is the largest depository of high-quality natural groundwater in Armenia and the region. As a result of poor management, uncontrolled increase of water usage by fisheries and other bid users, dilapidated infrastructure, corrupt practices as well as climate change, many communities in the valley now experience dire shortage of drinking and irrigation water. If the problem is not addressed soon, the groundwater area will shrink further, eventually turning Armenia's breadbasket into a desert. Each of the many stakeholders have their own move to make, and the PURE-Water

Participants of the
PURE-Water project

Fish farm
in the Ararat Valley

project works with them – from government bodies to schoolchildren – to support them.

The PURE-Water project is based on four components. The first one is "Policy and regulatory improvements to foster participatory use of water." Its goal is to identify gaps in the legal environment, develop a strategy and a roadmap of legal improvements based on broad consensus of stakeholders. The second component is to spur "Participation in and oversight of water resources management." "We want to make people understand that it's up to them to demand, communicate, feedback and control the situation with water supply," Hayastan Stepanyan, the component lead says. But it wouldn't work if those same citizens were not empowered to do so. That's why the "Public education and behavioral change" component is very important. The Urban Foundation works with all groups in the communities starting from kindergartens and schools. It is important to raise a generation that fully understands the importance of proper water resource management.

And finally, the fourth component refers to the involvement of the community members in practical problem solving through identifying and prioritizing infrastructural improvement needs in their respected communities. Through competitive process, 5 infrastructural projects involving energy-saving and innovative technologies are selected for funding; one of them located in Aratashen village is already completed providing 24-hour quality drinking water to the formerly water-stressed community.

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With the support of USAID, the Urban Foundation is making its modest contribution to resolving water sector issues in Armenia. With joint efforts there is a hope water in Armenia will be treated the way it deserves and will find its proper shape. ◆

ECOSYSTEM-BASED PLANNING APPROACH

For Public Servants and Local Self-Government Bodies

Nature is the biggest treasure shared among all nations – the ultimate source of all human life on Earth. The benefits provided by nature such as food, fresh water, medicinal resources, pollination, carbon storage, protection from natural disasters, and others are often referred to as ecosystem services. While ecosystem services are key to sustained livelihood and health, human activities often alter nature irreversibly. Thereby today, more than ever in human history, the consideration of ecosystem services in different sectors of economy and society is crucial for effective and ecosystem-friendly planning processes to secure the well-being of current and future generations. The "Integrating Ecosystem Services into Development Planning" guide is an important methodological tool to advance cross-sectoral integration of ecosystem services, applied in Armenia in the framework of IBiS programme by the joint initiative of the Public Administration Academy of the RA (PAARA) and GIZ on behalf of BMZ. To explore the overall framework of IES in Armenia, we talked to Meri Margaryan, Chief Specialist and Instructor at the Department of Training, Qualification Improvement and Research at the Public Administration Academy of RA (PAARA), and Alla Berberyan, Adviser at GIZ Armenia.

TEXT : IBiS / PHOTO : GIZ

Development plans and policies often take place at the expense of nature as well as people, whose livelihoods depend on nature. Recognizing how certain actions depend on or affect nature is vital for elaborating a sustainable development strategy, policy or plan. GIZ's methodological guide and international training course "Integrating ecosystem services into development planning" (IES) aims to assist policy-makers and development planners in various countries to create environmentally responsible strategic plans, which account for nature conservation and development needs. IES methodology is based on the Economics of Ecosystems and Biodiversity (TEEB) – a global initiative focused on "making nature's values visible." Recognizing the wide range of benefits provided by ecosystems and biodiversity, demonstrating these values in economic terms, and using these values in decision-making to address local as well as global challenges such as climate change not only contributes to ecological but also economic well-being.

The IES methodology helps decision-makers to integrate the risks and opportunities related to ecosystem services into their development plans through a step-by-step approach. A development plan can range from a government policy or plan, spatial plan to a protected area management plan or community development plan. The IES approach is applicable to any sector with projects and programmes that are nature-based or reliant on nature. The approach can also be applied at any level across the country, but it is particularly relevant for local and regional levels. The methodology of IES training consists of 6 steps, includes a fictitious case study, based on Harvard Case Methodology, and offers interactive practical work for practitioners. The reason for having a fictitious case study is that everybody can easily relate to the same context and use the same level of knowledge and information.

Ecosystem services are the benefits people obtain from nature.

The six steps of IES approach are: (a) defining the scope and setting the stage; (b) screening and prioritizing ecosystem services; (c) identifying conditions, trends, and trade-offs; (d) appraising the institutional and cultural framework; (e) preparing better decision-making; and (f) implementing change. Each of these steps includes (1) theoretical input, (2) an interactive exercise and group work, and (3) discussions for each step.

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In 2018, in the framework of IBiS and as part of the Klaus Toepfer Fellowship Programme, the IES training course was contextualized and adapted to the Armenian context, mainly based on in-depth situation analysis and needs assessment with the Ministry of Territorial Administration and Development (now Ministry of Territorial Administration and Infrastructure), the regional administration of Aragatsotn region and local self-government bodies. The development challenges and environmental issues particularly typical for Aragatsotn and Shirak regions as well as for the whole country were identified. As a result, the Armenian version of the training materials and the case study was introduced fully compatible with the socio-economic, environmental issues and the development challenges of the country. In the newly designed case study the fictitious country Ayas represents country-specific features of Armenia with names of the places sounding Armenian. An illustrative fictitious map depicting Ayas was created. The trainers from PAARA and GIZ went through an intensive qualification enhancement programme in Georgia, where a group of potential trainers from the three South Caucasus countries gathered to expand their knowledge. The IES training course has a flexible format and can be adjusted between 3-5 days, depending on the target group. The contextualized training course was piloted for the heads of communities, administrative representatives of settlements, and local council members of Aragatsotn and Shirak regions. Around fifty-five participants took part in the sessions. As a result of the training, the communities identified their priority ecosystem services and, for instance, Tsaghkahovit community included environmental measures in the existing 5-year community development plan and the 2020 planned action plan.

One of the main advantages of IES is its wide applicability. “We want the participants not just to receive information but also make concrete steps in the development planning to address different issues. We, the trainers, act as facilitators. We only guide the participants to arrive at their own conclusions and to formulate their own action plan,” Ms. Margaryan explains.

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The IES guide and the training highlight the complexity and interplay of human-nature interactions and their influence on each other. Sustainable pasture management in alpine and subalpine meadows can both contribute to biodiversity conservation as well as support local livelihoods through dairy cattle-breeding. “How does development impact and depend on ecosystem services and what are the possible trade-offs? These are the key questions to be considered in planning processes” says Ms. Berberyan. “In this context, trade-offs mean achieving a compromise between two competing or conflicting development and ecosystem conservation goals.”

The success of the IES approach and training relies on its institutionalization. In this regard, it is planned to integrate the IES into the training curricula for public servants and local self-government bodies, and to continue its implementation on a local level. Well-designed, tested, and optimized training tools play a major role in mainstreaming biodiversity and ecosystem services across the political agenda of local self-government bodies. This process however, will not happen overnight. Yet short- and long-term policy decisions will start taking into account different aspects, and development paradigms in Armenia will shift towards a more sustainable future. ◆

Payments for Ecosystem Services (PES):

Innovative Approach to Finance Nature Conservation

Private entities that usually depend on nature's benefits can ensure the long-term success of their operations, increase financial security, and make long-term savings if they consider natural resources in their plans and strategies. Still being relatively new to Armenia, Payments for Ecosystem Services (PES) schemes reveal a potential to increase the financing for the management of natural resources by drawing on public and private funds thus benefiting both businesses and communities alike. In the framework of IBiS programme, the RA Ministry of Environment jointly with GIZ, has explored the feasibility of Payments for Ecosystem Services (PES) scheme in Armenia, specifically for the case of Tsaghkadzor.

TEXT : IBiS

DISCLOSING THE PES SCHEME

As the pressure on biodiversity is increasing at a rapid rate worldwide so does the need for financing biodiversity. The term biodiversity financing refers to raising and managing financial resources and using financial incentives to support sustainable management and conservation of biodiversity. To meet the existing needs in biodiversity financing the past decade has given rise to various biodiversity finance approaches that also include innovative and non-traditional finance solutions. Public-private partnerships have become more common, and merged financing models from different sources such as public, private, official development assistance, are taking far better shape.
Payments for Ecosystem Services (PES) is one of those innovative finance solutions. To understand PES, one needs to be familiar with the concept of "ecosystem services." Ecosystem services are the benefits that we derive from nature. They include services such as the provision of fresh air, water and timber, eco-tourism opportunities, soil formation, pollination and carbon sequestration. The basic concept under payments for Ecosystem Services (PES) simply reflects the "user or beneficiary pays" principle meaning that beneficiaries or users of an ecosystem service pay the providers of that service, that is whoever conserves, improves or maintains the ecosystem service. For example, water users can pay to those who conserve the watershed thus providing good quality water supplies.
Ecosystem services for which the users pay should be well-defined, and payments should be made for actions that go beyond those, which would normally be expected under the law.
There can be different types of PES schemes. In self-organized private schemes beneficiaries of ecosystem services can have a direct agreement with ecosystem service providers. In public schemes, the government pays land or natural resource managers to increase ecosystem services on behalf of the public. And in public-private schemes both government and private funds are used to pay for the delivery of ecosystem services.
What is generally classified and accepted as PES has widened to the point where the term PES is often used very broadly to describe situations where some form of funding is provided to improve ecosystems.
Mr Arthur Ghavalyan, Head of Division of Economic Mechanisms, Standards and Technical Regulations of Environmental Protection at the RA Ministry of Environment and Head of the Ministerial Working Group, notes, "The core idea behind PES is the recognition, appreciation, and conservation of the ecosystem services we receive from nature, and the mobilization of new financial resources for this purpose. The crucial factor here is the willingness of certain entities to voluntarily provide finances. This has also to do with environmental awareness. If the person values nature, acknowledges its importance, and wants to conserve it, he might also be ready to pay for ecosystem services without any mandatory order."
The concept of PES is quite new for Armenia. However, PES schemes can be useful in extending biodiversity conservation beyond the protected area network, by rewarding and making sustainable land use practices economically attractive. In this context, the promotion, piloting, and practical implementation of PES schemes in Armenia seems pertinent.

THE CASE OF TSAKHKADZOR PES SCHEME

In the framework of IBiS programme, GIZ and the RA Ministry of Environment have jointly implemented a feasibility study of a pilot project in the framework of PES scheme focusing on the forest area of Tsaghkadzor.

"Tsakhkadzor, in addition to having unique nature, is a top tourist destination in the region. The advantage of Tsaghkadzor for PES scheme, unlike other areas, is basically its longer seasonality for the tourists and the capacity to host tourists both in winter and summer months," mentions Mr. Ghavalyan.

Tsakhkadzor forest PES scheme envisages that mostly the tourism businesses (mainly in the form of hotels) as well as Tsakhkadzor Municipality, the Armenian Government, and private donors could voluntarily pay for forest ecosystem services, in this case for ecological measures, reforestation and tourism infrastructure enhancement activities. The main potential provider of services could be "Hayantar" SNCO through its Hrazdan Forest Enterprise. They manage Tsaghkadzor forest and could be interested in increasing their services and contributions if provided with additional funds. Thus, the project would take the form of a public-private scheme focusing on Government as well as private funds for the provision of ecosystem services. To concretize the activities for the PES scheme, comprehensive activity packages have been developed that would ensure the delivery of ecosystem services that stakeholders are most interested in. The packages focus on (a) ecological improvements such as reforestation and forest rehabilitation; and (b) the development of tourism and recreation infrastructure in the form of four trail options and associated facilities such as benches, observation points, and signs. A 5-year financial model has also been developed to estimate the investment, management, and administrative costs of the packages and PES scheme.

The results of the feasibility study showed that the forests in Tsaghkadzor present a valuable asset for the tourism sector. The majority of the hotels in Tsakhkadzor confirmed that the existence of these forests helps to attract visitors. They also expressed their willingness, in principle, to participate in Tsakhkadzor forest PES scheme. On the whole, stakeholders have been positive about the outcomes of the assessment and their chances to collectively make a success of the scheme.

"The results of the study offer a specific roadmap for the scheme's implementation where stakeholders both from private and public sectors can contribute to nature conservation. What is needed, is the proactiveness from the local key actors to jumpstart the initiative," mentioned Ms. Alla Berberyan, Adviser at GIZ Armenia.

In general, PES has a voluntary or negotiated element, which separates it from strictly command-and-control or regulatory measures. It can thus reveal its best potential if it can be used in a broader sense applying "the user or beneficiary pays" principle thereby involving the private sector and community members more directly in improved ecological outcomes often in partnership with the Government.

GLOBAL INNOVATION FORUM 2019

TRANSFORMING INTELLIGENCE

This fall, the wave of innovation and technological advancement overwhelmed Armenia, and Global Innovation Forum 2019 entitled "Transforming Intelligence" (GIF19) was one of the key events which took place from 16 to 18 of October. The forum was co-organized by the Government of the Republic of Armenia and Armenian Scientific Diaspora Association (ASDA).

TEXT : MARGARIT MIRZOYAN

"We used to look at humans, we looked at us through lenses of – I am what I am. In the era of technology, we look at us, I am what I want me to be. It is not an out of body fate, it is fate that is controlled by the specie itself. And, how now that physical and social construct changes when you apply Artificial Intelligence. How do we improve our bodies with new discoveries in genomics, genetics, and biotechnology in general?" said the Founding CEO of FAST Armen Orujyan. The second GIF 19 was set to illustrate the impact of artificial intelligence technology on science and society from three perspectives: scientific, technological and industrial. The thought leaders and opinion makers of the sphere arrived in Armenia to share their expertise and participate in academic discussions and visionary debates. The forum started off with an interactive opening ceremony with a presence of AI and other distinguished speakers, namely, Armen Orujyan, Ruben Vardanian,a businessman and Co-Founder of FAST, Noubar Afeyanthe Founding CEO of Flagship Pioneering, and the Prime Minister of Armenia, Nikol Pashinyan. The latter took the stage to make an important announcement. "I want to make a statement that relates to the very initial and traditional thinking. Before making this statement, I would like to invite the Minister of Environment of the Republic of Armenia Eric Grigoryan and the Founding CEO of FAST Armen Orujyan to the stage." When everyone entered the stage, Mr. Pashinyan continued, "Our government has devel-



oped a very ambitious plan that should reach its peak on October 10, 2020. On this day, we plan to plant 10 million trees in the Republic of Armenia on the 10th day of the 10th month, which will symbolize the unity of 10 million Armenians around Armenian statehood, the Republic of Armenia and the Republic of Armenia. Thank you."

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In general, the forum had several primary goals: first, by means of state-of-the-art research, to expedite both global and local advancements, to contribute to the creation of a strong network between local and international specialists, industry giants, potential investors and governmental bodies, and finally, to boost the outreach and impact of the research and products presented by the participants.

The GIF followed two main tracks, namely Frontiers of AI and Science & AI. The first track covered the question whether AI can be used for the production of more accurate forecasting and have a positive impact on society. The second question under this track is where AL is in terms of having life-changing role in the important domains of human life. The discussion and debates were based on the following topics: AI for Forecasting Human Behaviour, AI in Agent-Based Systems, AI in Education, Computer Vision, Econophysics, Enabling Technologies and AI, Natural Language Processing, and Reinforcement Learning.

The second track focused on the ability of AI to transform the way we do science today and what the potential of AI is in the field of natural sciences. In particular, the participants discovered the following topics: AI in Astronomy, AI in Bioinformatics and Omics, AI in Biomolecular Structure and Function, AI in Chemistry, AI in Drug Design, AI in Materials Discovery, AI in Medical Diagnosis, and AI in Precision Medicine.

The forum was innovative in terms of its set up and structure as well. Through various session types in the futuristic atmosphere, the participants immersed into the world of AI. The discussion types followed the format of Visionary Talk, Keynote Presentation, Deep Insight, Industry Dialogue, New Voices and New Perspectives, Fishbowl session on Smart Earth and also session on Reshaping Innovation Ecosystems.

Around 90 scientists and field leaders from 20 countries arrived in Armenia to discuss the unprecedented technological advancement and their influence on humankind.

Such local and international high-tech industry leaders as Dr. David Yang, Founder and Chairman of ABBYY, and Hovhannes Avoyan, the Founding CEO of Picsart had their involvement in the Forum.

Overall, the Global Innovation Forum aims to host the brightest minds of today's Innovative world in order to become a base for the collaboration of academia, industry, government and policy makers, local and international organizations and financial institutions. This year, the list of companies and institutions involved such names as Facebook AI, Google Brain and Google DeepMind, Microsoft, and Flagship Pioneering setting a base for the innovative discussions in Armenia on world level.

ARMENIAN FORESTS FOR PRESENT AND FUTURE GENERATIONS

Have you ever traveled by car to Dilijan? Having passed by Lake Sevan and up some steeper hills, you emerge from a tunnel to a breathtaking view of a green wonderland opening out below. Or, have you ever cycled the road to Tsakhkadzor – where the color of the slopes shimmers from yellow to deep green as if, by some magic, the four seasons have come together? In these most precious natural spots, just like in many others, the one key element is the forest cover with its diverse beauty, with the abundant life it harbors, and all the good that it selflessly offers. Historically, forests covered about 40% of the present-day Armenia's territory; this share has now fallen to a very low 11.2%. What is the condition of the remaining Armenian forests today, and what does their future look like?

TEXT : MARGARIT MIRZOYAN / PHOTO : GIZ

First, there was the commitment to the Paris Agreement to increase the forest cover from 11.2 to 20.1 by 2050. Then came the recent announcement of the Prime Minister Nikol Pashinyan during Global Innovation Forum 2019, that Armenia plans to plant 10 million trees by the 10th day of the 10th month, which will symbolize the unity of 10 million Armenians. It seems like the government is determined to make Armenia a forest country. But let us start from the beginning.
The economic crisis of the 1990s hit Armenia hard, and the forest ecosystem in the newly independent country fell under enormous pressure. Illegal logging for household purposes suddenly emerged as a rapidly growing problem. The so-called "dark and cold years" resulted in mindset changes, as a priority to sustain one's family was upheld by many citizens at the expense of the forest. Too many people chose to temporarily disregard the importance of the forest for livelihood purposes. The forest has been, for centuries, a crucial factor in maintaining the appeal of their land with its stable, balanced, and nourishing environment year-round. "The problems we are facing, such as climate change, poor air quality, and many others have been solved by forests for millennia. Therefore, it is crucial to recover the forests in Armenia to adapt to these challenges" indicates Mr. Samvel Sahakyan, Head of the Forest Committee of the RA Ministry of Environment.

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The task of forest recovery has several dimensions. One crucial aspect is the cooperation with forest-adjacent communities dependent on the forest for their livelihood. The Forest Committee and "Hayantar" SNCO work closely with these communities. Given the socio-economic issues, especially in rural areas, they recognize reforestation and afforestation as a win-win solution through creating new job opportunities and increasing the forest cover of the area. Reforestation and afforestation, at a glance,

THE SO-CALLED "DARK AND COLD YEARS" RESULTED IN MINDSET CHANGES, AS A PRIORITY TO SUSTAIN ONE'S FAMILY WAS UPHELD BY MANY CITIZENS AT THE EXPENSE OF THE FOREST

might seem as a short-term solution to unemployment, but the consequent maintenance and conservation work in the areas will continue to require significant human and financial resources. Left with no alternative, people do not think about the impact of cutting trees.
Another dimension is the international framework given by the United Nations Framework Convention on Climate Change. In the framework of the latter, Armenia committed to increase its forest cover up to 20.1% by 2050, which means an increase by around 265,000 ha. The available forest lands for achieving this target are currently insufficient in Armenia. Here, enabling conditions should be created for the establishment of forests on community and private lands. Additionally, according to Mr. Sahakyan, there is a need to establish modern nurseries with newer and more efficient technologies. In the past years, the country used open-air nurseries, with bare root seedling production. In recent years the technique

of containerized seedling production has been adopted. This ensures appropriate conditions for the germination of the seedlings and successful transplantation into new locations.

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Both Mr. Sahakyan and Vahe Matsakyan, the acting Director of "Hayantar" SNCO, emphasize the importance of environmental education as another essential measure for ensuring the well-being of the forests. Inhabitants of forest-adjacent communities should leave behind their perception of forests as a source of firewood. Instead, the forest should be seen as a vulnerable ecosystem that belongs to them and needs their protection. The lack of awareness and sense of ownership leads to another form of damage – human-induced fires. For example, some villagers believe that burning crop fields can lead to better production, but the fire they make often gets out of control and spreads to the nearby forest. Another challenge is the limited access to formal education in forestry in Armenia while the country experiences a severe shortage of local experts in the field. "Most of the experts in the forest sector are already retiring, and there is a need to make the sector more attractive to younger generations." says Mr. Sahakyan, "But to accomplish this task, there is a need for higher salaries and modern technologies."

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Both the Committee and "Hayantar" SNCO support the institution of adequate administrative measures. There are different energy alternatives to prevent the use of firewood. For example, the technology of briquettes is gaining more popularity in Armenia. This innovative approach is beneficial both from economic and environmental perspectives. Briquettes produced from non-wood raw materials, such as agricultural remnants (e.g., straw), could contribute to decreasing the demand for firewood. Still, a large segment of Armenia's population continues to use firewood. To make alternatives to firewood more attractive, they have to become more affordable, while energy efficiency of rural households has to be improved in parallel.

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For years, various environmental programmes have been implemented in Armenia to contribute to sustainable forest management. Among the important measures is the development of the National Forest Management Information System (NFMIS) with the support of GIZ on behalf of BMZ. NFMIS is an important tool for operational planning and forest information management. It is based on a GIS client-server technology, which provides a common database and facilitates information processing and communication. The system is enabled to contribute to sustainable forest management through the provision of innovative and transparent administrative and technical procedures. NFMIS has been piloted in one forest enterprise and it is planned to be institutionalized.

THE FOREST DOES NOT BELONG TO THE RA MINISTRY OF ENVIRONMENT OR THE FOREST COMMITTEE. THE STATE IS RESPONSIBLE FOR ITS PRESERVATION, BUT IT BELONGS TO THE PEOPLE AND WE ENCOURAGE EVERYONE'S PARTICIPATION

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In previous years, the forest sector experienced several structural changes. Forest management was transferred from the RA Ministry of Agriculture to the RA Ministry of Environment. The new post-revolutionary government has placed forest conservation high on its political agenda. “Forest is our heritage; all countries which have large forest areas have inherited this treasure from their ancestors. Some waste their inheritance, while others decide to maintain and enhance it,” concludes Samvel Sahakyan. “The forest does not belong to the RA Ministry of Environment or the Forest Committee. The state is responsible for its preservation, but it belongs to the people and we encourage everyone's participation in taking care of it.” The growth from seedlings to a mature forest takes place across generations throughout 80-120 years. Therefore, cross-generational work and responsibility are necessary to secure the sustainable management and growth of Armenian forests. ◆

ARMENIAN FORESTS:

UNDP Perspective

Forest economy in Armenia selflessly supported the nation during the blockade years of early 90's. The country managed to get out of the post-soviet crisis, but the forest sector in the country almost "drained," suffering from unsustainable utilization and illegal loggings. In the past years, it became clear that time has come to put all efforts for the conservation and improvement of the forests in Armenia. UNDP, as a critical player, introduced two prominent initiatives tackling the problems of forests and providing hands-on solutions to these issues. Regional Post talked to the team standing behind these projects.

TEXT : MARGARIT MIRZOYAN / PHOTO : UNDP

The first large-scale forest project initiated and led by UNDP (Mainstreaming Sustainable Land and Forest Management in Mountain Landscapes of North-Eastern Armenia) was introduced in 2016 and will conclude in 2020. Forest enterprises of Lori and Tavush regions are at the spotlight of the project, spreading in two directions. The first one refers to the collection and identification of accurate information about forests: through forest inventory and mapping via field computers, GIS, and GPS systems. Besides the purely technical components, the project includes capacity-building activities designed for the communities in which they operate to ensure the inclusive and long-term nature of the project. By the request of the Ministry of Environment, a dendro-chronometer was donated to the National Bureau of Expertise. The apparatus shows the age transformation of the trees; since when illegal logging takes place, it's usually hard to identify when exactly the trees were cut, the latter is of great help. "The locals might claim that the tree was cut last year, but the tool enables to conduct an

S. Papikyan is getting acquainted with briquetting production unit in Mets Parni community

Improved degraded pasture in Gugarq community

expert assessment which reveals that the tree was cut, for example, a few months ago," says Hovik Sayadyan, the coordinator of the project. "In other words, the tool helps to restore the real picture, promoting the development of criminology in forest sphere." To engage the younger generation in this practical part of the field, the project cooperates with various research institutions and universities, namely, with Yerevan State University, NAS RA Institute of Zoology and Institute of Botany, Armenian National Agrarian University, and others.

The second key direction of the project aims to offer alternative income opportunities to the communities in forested areas, in order to relieve the pressure on this already damaged ecosystem. The project has the objective of restoring ca 5000 hectares of forests degraded due to tree logging, plot burning, shrublands, and windthrows. Up to this moment, appropriate actions have been taken toward restoring around 2000 hectares. About 600 people participated in the forest rehabilitation activities, including the employees and residents of six forest enterprises in Lori and Tavush regions.

The project also touched upon the issue of pastures in forest-adjacent areas, with a defined objective of restoring around 1000 hectares of degraded forests or forest-adjacent pastures. Six target communities were identified – Margahovit and Gugarq settlements in Lori region and Yenokavan, Lusadzor, Koghb and Berd communities in Tavush region. The target communities received all the necessary technical support to work on degraded pastures. 227 hectares were cultivated under fodder production or improved in these six communities, to ensure the sustainable utilization of the meadows. "It's a common practice in Armenia when livestock is taken out to the grasslands to pasture on the day the snow melts, and in autumn they keep livestock at the pastures up until the moment it begins snowing," implies Mr. Sayadyan. "This practice eventually disturbs the accumulation of nutrients by the plants, to blossom in spring. As a result, the pastures degrade." The whole idea of the project is to ensure that at least in six communities (including about 200 livestock breeders) the grazing period is optimized, and early spring and late autumn are excluded.

The project also works towards ensuring alternative employment opportunities for the locals.

Continuing its march, the project constructed a 280-square meter passive solar greenhouse in Ardvi community, Lori region, where the residents can plant different vegetables year-round. The greenhouse doesn't belong to a single person; it is the property of Ardvi foundation, and all the income it generates is directed to the development of the village and to other greenhouses. In Tavush region, anti-hail nets for 18 ha have been procured for vineyards and orchards. "The idea is that if people have constant harvest, they can sell it, generate income, and then pay for gas consumption," indicates Mr. Sayadyan. "The people in villages use fuelwood all year round, to get warm in the winter and to prepare food in the summer, but if people have an alternative income source and pay for the gas at least for half of the season, the amount of fuelwood utilization will decrease." Within the framework of the project, energy-efficient ovens have been designed. They consume 30% less fuelwood than ordinary ovens used in households and are more efficient in terms of heating due to their unique design. The idea, design, and testing were conducted within the project, and the ovens were given to 280 community representatives so that they demonstrate their positive impact. Later on, a production of more similar ovens was ordered but not within the project.

In cooperation with Bridge of Hope NGO in Ijevan, the UNDP project installed photovoltaic systems and solar water heaters at six schools and kindergartens in near-border settlements such as Koti, Berqaber, Sarigyugh, Bagratashen, Koghb, and Ijevan. These schools previously used fuelwood as the primary source of heating and electricity. Each panel is saving tens of cubic meters of firewood now and providing healthy environment for our children.

In cooperation with WWF, the programme also provided small grants of AMD 1.2-1.5 mln to Teghut and Haghartsin communities in Dilijan. Two hundred applicants applied for these grants, but only 52 received them. As a result, various small businesses flourished in the region which, at first glance, may seem to have nothing to do with the conservation of forests. For example, small phone repair facility, manufacturing of semi-precious

Cultivation of degraded arable land under fodder production in Mets Parni community

stones, textile or sewing machines, chicken coop, and several guest houses. However, the point is to give community members an opportunity to practice social entrepreneurship and to stop using the forest as an income-generating source.

Another critical achievement of the project is the procurement of a briquetting facility and supporting agricultural machinery to establish a production of briquettes and pellets made of mostly straw, as an alternative to fuelwood. Currently, the project already has a portion of these produced at Lori region's Mets Parni settlement. Until now, 400 tons of briquettes have been produced, and a large part of it was given to vulnerable families based on social considerations and to promote briquette-based culture. Fortunately, this technology is prospering in Armenia, and UNDP plans to organize a forum of pellet and briquette producers, for all field actors to get acquainted with each other.

The support of small productions is another vital component of the project. In Voskepar settlement, in cooperation with the UNDP "Integrated support to rural development: Building resilient communities" project funded by the Russian Federation, a solar fruit drying facility was established, where the berries from the forests are collected, frozen, processed, packaged, and sold. The project installed solar panels and a solar water heating system at the site so that all the operations in the output would be ecologically-friendly. The same way, in Koti community the project supported an entrepreneur who initiated milk production in a border-adjacent settlement – providing an alternative to heating via fuelwood. In the Debet community, in 81 households, the programme funded the development of backyard berry plantations.

As mentioned before, the engagement of younger generations is also at the spotlight of the project. In Stepanavan region, the project supported the local youth organization, enabling them to develop drone technologies. High school students managed to configure the drones, and currently, they are using these drones for mapping, and they even conduct monitoring to prevent fires. In the same area of Stepanavan, a small recreational sports complex was established, with zip lines for both amateurs and professionals. "The idea is to show people that the forest can serve as a holiday location, not only for fuelwood. The income received will be directed to afforestation measures," adds Mr. Sayadyan. Lori region's Dzoraghbyur community there is no gas and pressure on surrounding forests is essential. Project team succeeded to install solar panels and solar water heaters both for school and kindergarten, as well as introduce energy-efficient ovens to community.

Another critical aspect of the project is the assessment of ecosystem services the forests of Armenia can offer. For example, we usually talk about climate change, but previously, there were no laboratory analyses and field estimations of how the forests in Armenia absorb CO_2. Similar operations have been conducted for the entire Northern and north-eastern Armenia. Recently, in January, ten employees from different forest enterprises and "Hayantar" SNCO participated in a training in Belarus, and a website for the State Forest Committee was developed.

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The next forest project of UNDP (Addressing climate change impact through the enhanced capacity for wildfires management in Armenia) was launched in 2017 and will wrap up in 2020. The project follows several directions, but the most visible one is the provision with technical support to the forest enterprises. The project procured vehicles and equipment which is being forwarded to the Ministry of Emergency Situations and the Ministry of Environment, and later on, directed to HAYANTAR SNCO and specially protected areas. The equipment enables to extinguish the fire more efficiently. "In Armenia, most of the fires are man-made. For example, people burn their land fields for more abundant production of crops; the fire gets larger, spreading to the near-located forests," indicates Vardan Melikyan, the technical task leader of the project. Even though the Armenian law prohibits burning the fields, people continue this practice. The UNDP project is also aimed at the successful implementation of the law. To examine the current situation, the project requested data from the Ministry of Emergency Situations, and it turned out that there is a more significant number of wildfires in Kotayk region than in other marzes. Analysis has been done in that particular region, which revealed that people mostly burn bioresidue left after the harvest of grains. But as there's the technology of briquette production, they can create fuel from organic waste. So instead of burning the bioresidue at the fields, the project wants to establish briquette production at Kotayk Marz and use these leftovers after the harvest to produce organic fuel.

During the fire in the Khosrov forest state reserve back in 2017, it became clear that there's an efficient management issue as well because there was a confusion regarding the responsibilities of the organizations involved. Thus, the project also

Project expert is monitoring the restoration of degraded forest ecosystem in Noyemberyan forest enterprise

“Summer forest camp” in nearby Mshkavanq church

The installed solar panels in Berqaber near-border village kindergarten to exclude firewood based heating system

includes the development of protocols and instructions for similar cases, so that the institutions involved will have an idea of the overall operations. In the future, there might be a need for legislative changes to make these protocols a widely used practice in all institutions. In cooperation with the relevant Ministries, the project also came up with the Forest Fires Information System, which will be an online tool. “Employing satellite images and the data received from meteorological stations, the software will identify the level of fire danger in different locations,” explains Mr. Melikyan. Armenia has such a system, but it needs to be upgraded. The new tool will provide more accurate data, which will enable to prevent the catastrophes much faster and take urgent steps. The next direction of the project is the development of relevant curricula for the State Academy of Crisis Management of the Ministry of Emergency Situations and the Armenian National Agrarian University to educate new specialists. Of course, there are firemen, emergency specialists, but the forest fires have their peculiarities, and there are very few people with that particular expertise.

Another initiative within the project is the Climate Change Technological Accelerator, which helps the emerging IT companies and enterprises to bring their climate-related products into a presentable form for entering the market. Now, the initiative is in its second phase. The call of the first part was for the organizations working in the sphere of agriculture and forest economies, but the target of the second phase is sustainable urban development projects. For six months, the startups attend the accelerators where they are trained in three directions: technology, impact, and business. Here they finalize the product and become ready to search for financing and to enter the market. For example, on the topic of forest fires, they had two initiatives. One was about the application of sensors which identify smoke. This will help to prevent fires or at least address them earlier and avoid more significant catastrophes. The second one was software for modeling the spreading of forest fires. The software enables to identify the fire tendencies based on the weather forecast, the geographical position, landscape of the burning location, and the tree species in there. Primary information is already in the software but combining with the daily forecast information, the product makes accurate predictions. “The software is an excellent tool for the firemen to define the right directions when working in the field, and also it will be a useful tool for identifying the strategy of sustainable forest management,” says Mr. Melikyan. Recently, the project provided three small fire trucks to the Ministry of Emergency Situations. They also purchased equipment, tools, and specialized clothing for 360 firefighters. In the future, awareness-raising activities are in focus and also currently, the international expert of the project is developing a manual for fighting forest fires. Based on the guideline, next year, TOT format classes will be conducted for the specialists of the relevant Ministries.

AUA ACOPIAN CENTER FOR THE ENVIRONMENT:

The Independent Voice of Nature within Armenian Society

The American University of Armenia (AUA) Acopian Center for the Environment has been around for over 25 years with a mission to make the environment a central point at the global discussions taking place in Armenia. Regional Post talked with the Director of the AUA Acopian Center Alen Amirkhanyan about the present and future of the center and its role in the transformation of the Armenian society.

INTERVIEW : MARGARIT MIRZOYAN / PHOTO : AUA ACOPIAN CENTER

How was the ACE brought to life, and what is the main idea behind its operation?

— The AUA Acopian Center for the Environment has been around since 1992. One year after the establishment of the AUA, Sarkis Acopian, the benefactor of the center contacted its administration, suggesting to establish an environmental center and later on hugely supported its operations. Mr. Acopian was a migrant from Iran of Armenian descent who moved to the US and gained his wealth in the electronics industry but had a huge passion and commitment to wildlife conservation. He and his family actively worked in this direction in Pennsylvania, cooperated with several environmental organizations and educational institutions to create a similar type of awareness, educational and research base, and when AUA opened its doors, they saw an opportunity to bring this passion to Armenia. Initially, the center was called Environmental Management and Conservation Center. The first significant project they started in the first few years was The Birds of Armenia project, which served as a base for the publication of The Birds of Armenia handbook, which remains the only field guidebook about the bird populations in the country. This was the genesis of the center's establishment.

How does the center operate? What is its primary focus?

— The center has three broad directions. One is Education. We offer the bulk of the environmental courses to the AUA undergraduate and graduate students. At the undergrad level, the center offers more than 12 courses in the frame of General Education offerings. The courses include introduction to environmental sciences, food, mining, waste, water, sustainable cities, biodiversity, and more. We also teach several courses at the graduate level. AUA graduate students have to complete one unit of environmental course to be able to graduate. Outside of AUA, we've also developed environmental education materials. With UNDP support we've a 20 hour environmental education modules for civil servants and municipals works. This is now available as an online training tool. The center's other direction is Community Outreach. We engage with communities, such as through our Sustainable Energy Academy, where we work with communities to identify ways in which communities can improve the energy efficiency of their buildings and introduce renewable and clean energy sources to meet their needs. We work with community members to come up with their own solutions, which also leads to community empowerment. Last year, we even financed some of these exceptional ideas for community members to implement them. We've also have youth outreach programmes, working with a large network of youth

Government of Armenia

groups to engage them in understanding and acting on local environmental challenges. Another key community outreach work has been organizing policy discussions and debates. We've been able to stimulate policy dialog on ecotourism, mining, waste governance, and forests. The events have been able to propel to center stage policy discussions that are missing in the country. The communities engaged cover the rage: policymakers, civil society organizations involved in the sector, relevant businesses, and academic institutions. We rarely organize conferences purely for academics; we do action-oriented engagements. That's why it's called community outreach. The third direction of the center is the Research component, which ranges from fundamental scientific research to policy research. The latter, for example, is a study on waste governance, its legal and institutional framework in Armenia and how it can be aligned to circular economy principles. Currently, we also work on several papers regarding the forest sector, which still can become starting points for policy discussions as well. We also have fundamental research on water and biogeochemical cycles. We also are part of a large-scale EU Horizone 2020 project, Respondrone, where we are analyzing the needs of first responders in cases of environmental disasters.

Engaging policymakers in key discussions. The Forest Summit 2019.

AUA Ecotourism Conference 2019 field visit, focused on protected areas and ecotourism.

As far as I know, besides the AUA Acopian Center's core work, the center has started couple of parallel initiatives.

— There are two other initiatives. The first one is the AUA GIS and Remote Sensing Lab that we created in partnership with the AUA Akian College of Science and Engineering. The lab brings know-how to AUA on using earth observation platforms and satellite images for environmental planning, monitoring, and diagnostics. The geographic information systems (GIS) tools, in turn, enable mapping of environmental, public health, demographic and more types of data. Our second major initiative is the AUA Center for Responsible Mining, which was established in 2014. It's separate from the AUA Acopian Center in terms of its agenda because mining does not only pose environmental issues; there are public health, occupational safety, disaster management, community and national economic development aspects as well. Here in Armenia, there's a certain knowledge base on metallurgy, but there was not much in our country on mining that is socially and environmentally responsible. This idea was the main reason for creating this center, which brings an academic, evidence-based discourse on the critical issue of the mining sector in Armenia.

What about international cooperation? How did the center become a bridge between local and foreign organizations and initiatives?

— Armenia is environmentally a very rich and unique place and a lot of international researchers in the field are interested in a country like ours. Also, Armenia is one of the EU's Eastern Partnership countries, and there's a focus on including these countries into EU initiatives. So, our focus was to tap into it and connect with all these networks and programmes. We had several EU funded projects, and we've applied for several new ones. We had tremendous success with the Horizon 2020 project, which is a major EU research and

commercialization funding facility. We have two projects that have been approved, and this is connecting Armenia to the leading researchers abroad. The projects themselves are very interesting, but the relationships that come out of these projects are also very critical for Armenian researchers and institutions. We're also largely engaged in academic exchange programmes. For example, with funding from DAAD in Germany, we have a flourishing cooperation with the Hohenheim University on the use of GIS tools in biodiversity monitoring and assessment. We also have Erasmus Plus collaborations, where we've developed academic programmes and curriculums with our European partners. In addition, we've had EU Black Sea Cross Border Cooperation projects, and more is on its way. Being part of this network means increasing and expanding the sphere of influence of our work.

My question might sound trivial, but why do you think that educating the younger generation is more effective in promoting the environmental questions in Armenia than, for example, conducting hands-on operations at the sights?

— First of all, these two are not mutually exclusive. I think you need several approaches to environmental work and our approach is not only education, but it's also engagement and piloting in the communities, as well as research that investigates and analyzes the experience and puts forth new ideas. All these are very important for a healthy system that tries to generate innovation. Of course there are sometimes conflicts of values. Different people prefer one outcome over the other. Sometimes this preferences are based on inadequate understanding of facts and processes. I think that's where education is vital for the people – it can inform their values. Education creates a common language and understanding of issues – a base on which people can have civilized discourse.

Do you think that we have a lack of eco-education or environmental awareness, particularly in Armenia?

— I think Armenia has come a long way. It has changed a lot in terms of environmental awareness. I think Armenia has become much more dynamic in this discourse; still, we have a lot to do in terms of the environmentally informed policies. Such policies should concern the ministries of economy, finance, territorial administration, environment, and education, to name a few. The challenge for us is to understand how we can see environmental issues as cross-cutting, issues that should concern us all. If the concerns are delegated to one specialized group or agency, then they are more likely to become sidelined and marginalized.

AUA Acopian Center researcher interviewing community members on their natural resource use. Initiative partner, the University of Hohenheim, Germany

Chambarak youth at the Sustainable Energy Academy 2018 exploring solutions for their communities

This challenge is not unique to Armenia, but if we manage to overcome the isolation of the environmental topics, it would be a great success for us and a great example to set for the world. Our center has been talking about the circular economy approach, which promises to explore the interconnectedness of the economic and environmental domains. It guides countries on how to align economic activities with the material and energy flows that are within the ecologically possible. Of course, historically, many rural societies lived that way – in harmony with the environment, but with modern urbanized and industrial economies we'd gone the wrong way for a while and the industrial revolution radically shifted the relationship between humans and nature. I think now all stakeholders from both private and governmental sectors should try to figure out how to realign this relationship.

We discussed the role of the government and the economy. But what is the role of universities and similar institutions in making this alignment possible?

— I found that the universities in Armenia are not utilizing their potential as a force social transformation. I think that educational institutions have to become more aggressive in figuring out their role in society. Here in Armenia, usually, universities are service providers – they teach and at time are commissioned to conduct research. They are rarely the ones that come up with ideas that challenge society. My vision of this center

at AUA is that we should become that force, esp. by working with partners and stakeholders. We as a center are about healthy dialog and discourse on issues. Everyone can bring their ideas to the table. We can discuss, disagree, even dislike each other, but at the end of the day we have a healthy discussion and we can think about directions in which we can advance. In such discussions various interests are taken into account and the decisions are made on a very solid understanding of various positions, interests, costs and benefits.

Let's get back to the center: what are you currently up to and what upcoming events and projects do you have?

— One major event is the AUA Ecotourism Conference 2019. This is the fourth year we've done this conference. While for the last three ones we used to bring everyone who does something in the sphere of ecotourism in its broader sense, this year we've decided to change the format as, in my opinion, the previous one achieved what it was supposed to, viz., network people and exchange ideas. This year we're going to focus on one topic, namely, on the role of protected areas in development of tourism. We've invited EUROPARC Federation, the organization creating standards and processes in which protected areas can become tourist destinations but ensuring environmental as well as social and economic sustainability. IUCN's World Commission for Protected Areas Tourism Specialists Group is also among the attendees. The International Ecotourism Society is present as well. We are bringing significant capacity to Armenia to work toward developing sustainable tourism approaches that helps people and nature. The next big conference we're organizing is the Forest Summit. We are doing this in partnership with the Armenian Tree Project. The whole idea of this summit is to make forests a focus of policy discussions. We've heard a lot about forest issues in the news recently; illegal logging and the fact that some communities feel entitled to logging is a clear example of policy failure. People have become so dependent on the forest that they feel like it's their right to cut the trees. This is a policy failure. Also Armenia has committed to doubling its forest cover by 2050. How are we going to get there when we still rely so heavily on fuel wood from our forests? These are the questions the summit will address. It is a big multi-stakeholder input for the government in developing a national forest policy.

We've also done smaller events, for example, with Nordic Solutions for Sustainable Cities, where we've connected the international experts with policy decision-makers here to discuss urban sustainability, especially in the urban mobility. Another prominent initiative is EU's Horizon 2020 programme. As I've mentioned, two of our proposals have been accepted. One is Respond Drone project, which we do in cooperation with the Ministry of Emergency Situations and with German Space Center as a lead partner. It's an 8-million-euro project, and we have some of the top software developers in the world on our board. The other project is called Peritia, and the lead partner here is the University College Dublin. This project examines the role of experts and trust in experts in policy making. So, this project tackles the conditions of trusting experts and how to enhance this trust. This is a critical part of enabling deliberative democracy.

Nordic Solutions for Sustainable Cities focused on aligning the natural and the built environment.

What is the future outlook for the center?

— The center is a center of excellence at the American University of Armenia. It will continue to grow with the number of projects it does and the staff. ACE will deepen its networks and expertise. We're not going to be an institute of Zoology or Botany as there are experts in the country working on those topics. We see ourselves as a center where systems thinking takes place, defining how things connect and what the missing parts of this system are and how all of these are connected to social transformation. Our task is to bring together the partners and the networks improve knowledge, policymaking, community awareness.

REDESIGN/RETHINK, REDUCE, REUSE, RECYCLE

Waste Governance Initiatives by the AUA Acopian Center for the Environment

TEXT : MARGARIT MIRZOYAN / PHOTO : AUA ACOPIAN CENTER

When speaking of waste management in Armenia, we usually discuss problems with waste collection, littering in tourist areas or along roads, overuse of packaging materials including plastic bags, and low rates of recycling. Less talked about, though also critical, is what we do with the waste that we collect. The final disposal sites in Armenia are not managed to acceptable standards, opening the door for environmental, public health, and, even, economic harm. To provide a comprehensive understanding of these issues, the AUA Acopian Center for the Environment has several ongoing projects on solid waste governance in Armenia. Regional Post talked about these projects and their results with Harutyun Alpetyan, the Circular Economy Specialist at the Center.

Reportedly, Armenia has more than 300 dumpsites used by communities. Not a single one of these, though, is a sanitary landfill. A sanitary landfill offers key engineering solutions, which are standard in the developed world. It compacts and covers waste to reduce volume and prevent dispersion. It controls leachate—toxic liquids that form in the landfill—from infiltrating into soil and underground water. It also collects methane produced from decomposition of biological waste, preventing explosions, fires, and emission of this potent greenhouse gas. But most importantly, and at a minimum, a sanitary landfill should have controls on what types of waste enter the landfill, preventing entry of hazardous materials. The open burning of this waste alone results in emissions of dioxins and other toxic pollutants dangerous for human health. In response to the inadequate waste governance in the country, Mr. Alpetyan believes some simple but immediate steps are needed to improve the situation. He does, however, highlight that, at least, Armenia has extensive coverage of collection in urban communities, which is a primary precondition for having a modern waste management system.

"Garbage on the streets that is not collected on time is a big problem. This is what people see and react to. Addressing this issue requires having adequate operational and contract management capacity," says Mr. Alpetyan, "Less visible is what happens to this waste once it is collected. Unless you live next to a dumpsite, most people don't care about what happens to that waste. This mindset has to change. People have to care that the material that they've disposed continues to have negative impact long after it is out of their sight. They should also care that it is material that was extracted, processed, transported, and produced at great environmental cost," emphasizes Mr. Alpetyan. Changes to this mindset have to come from more education and awareness raising. While citizens can do a lot, they cannot be expected to solve all waste issues. Also important is investing in infrastructure for waste management. "We need to control what enters into landfills, we need to have waste sorting system, we need to ensure toxic

School children learning about nutrient cycles through vermicomposting of organic waste. Initiative partner Yerevan Municipality in 2015

Experts sorting municipal waste for the Waste Quantity and Composition Study

and hazardous materials are directed to specialized landfills or sections in landfills, etc. These are not things ordinary citizens can do. This is an institutional and an infrastructure investment issue," says Alpetyan.

To shed light on paths forward, the AUA Acopian Center for the Environment is implementing four projects on waste governance. The broad question is to how we can improve the way view the materials flowing through our economy and our lives, adopting a circular economy lens. All waste types, except radioactive and mining waste streams, are considered. This includes municipal, automotive, medical, industrial, electric and electronic, construction and demolition, and agricultural wastes.

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The first project is called "Waste Governance in Armenia." The project is financed by the Ministry of Foreign Affairs of Sweden and is implemented in partnership with Swedish Life Foundation and Miljö & Avfallsbyrån AB as expertise support. The project aims at providing independent expert advice to Armenian government decision makers for development of national solid waste governance policy, strategy, and roadmap basing on the principles of the Circular Economy.

The second project is called the "Waste Quantity and Composition Study." It is funded by the AUA Manoogian Simone Research Fund (MSRF) and studies the quantities and composition of the solid waste in Armenia. It was developed in partnership with the RA Government, namely with a special 22-member interagency workgroup on waste issues formed by the decree of the prime minister in 2018. Advising on this project is the Swedish firm, LL Bolagen. Previously, eight studies have been done on waste composition but they all vary in their methodology, geographical coverage, and seasonality. While most of the previous studies focused on one region or community, the WQCS project aimed to get a country-scale representative sample making tests in 6 locations with the same methodology. The waste sampling and analyses were done in Yerevan, Ararat, Gyumri, Vanadzor, Hrazdan, and Kapan cities. Hopefully, there will be resources to replicate this study at different seasons as the seasonality factor is crucial to waste composition. "We didn't want a consultant to come and do this for us. We emphasized the training and local capacity building aspects," says Mr. Alpetyan. "We built an outstanding local team capable of repeating this study whenever enough resources are available."

The third component of the AUA Acopian Center's waste governance direction is the "Mapping of Waste Handling in Armenia" project. It is implemented in collaboration with the Ministry of Territorial Administration and Infrastructure. The team will map where the waste is generated, how it's handled, and where it is disposed of. The project will cover all communities in Armenia. "In short, we are mapping the waste handling capacities: equipment, bins, and dumpsites," indicates Mr. Alpetyan. "One of the results of the project will be the registry i.e., the database of landfills with their geospatial data." The database will be available online and will serve to the public benefit. The project also has a capacity-building element to help the partner ministry to raise its efficiency.

And finally the fourth project is the Waste Recourse Library. The center has already developed a resource portal for waste governance in the country. It has gathered information on the current legislation on waste in Armenia, including laws and sub-legal acts. The library includes the database of institutions involved in the sector along with the research and policy papers and report on projects implemented in the country.

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The issue of waste management is very complex and has many dimensions including social, environmental and economic. These projects are a part of a more significant direction the country has to move addressing the challenge from a circular economy perspective. This includes following the 4R principle: redesign/rethink, reduce, reuse, and recycle. "When saying recycle, people usually imagine plastics," says Mr. Alpetyan, "but we should think wider and find ways to separate all recyclables from the municipal waste stream to avoid losing value. Diverting organic waste from landfills has a huge economic potential for biogas and fertilizer production. This also reduces the negative environmental costs from leachates and greenhouse gas emissions." Soon Armenia will have two engineered landfills financed by the EU in the Kotayk region and Yerevan. "When spending millions of euros on closing the old dumpsites and building new sanitary landfills, we need to think at least of prolonging the use period as much as possible," suggests Mr. Alpetyan, "So even if we manage to divert only organic waste, which makes 50% of our municipal waste, away from landfills, we will exploit these expensive landfills at least twice longer." ◆

THE URBAN FOUNDATION:

A Player of from the CSO Super League

This year the Urban Foundation celebrates 15 years of its official establishment, but the team has been working together well before 2004: From 2000-2004, as part of the Washington-based Urban Institute, the team implemented the largest USAID – funded project in Armenia – the Earthquake Zone Recovery Program (EQZRP), in the result of which more than 7000 earthquake-displaced households were permanently housed, hundreds of public spaces were rehabilitated and reclaimed. The success of the project, apart from generous support from the American people, was the result of an exceptional teamwork. After completion of the project, in April of 2004, the core of the team established the Urban Foundation, the Urban Institute's spin-off – a local non-profit to continue supporting the development and democratization of Armenia. Thus, a long journey was launched to provide decent living and healthy environment for Armenian communities. Since then the Urban Foundation has undertaken more than 80 successful initiatives throughout Armenia and has earned its place in the super league of Armenian civil society organizations.

TEXT : ARTAVAZD YEGHIAZARYAN / PHOTO : URBAN FOUNDATION

WHAT DOES SPECIFICALLY THE URBAN FOUNDATION DO?

The team promotes integrated community development approach where business, social and environmental aspects coexist harmoniously in the community. Sounds idealistic but the Urbaners are not daydreamers. They try to achieve their ambitious mission by helping improve communities' down-to-earth functions, for example waste management. Improving waste management throughout Armenia has been on the Urban Foundation's agenda, long before the government of Armenia declared it as a priority. Dozens of innovative projects on waste separation have been implemented by the organization in different parts of Armenia – from promoting waste sorting among citizens to establish a recycling plant that uses plastic waste to substitute cement in producing construction materials.

WHY PLASTIC?

Because it constitutes up to 35 percent of total volume of waste. It all started ten years ago with several bins for separation of plastic in the industrial town of Alaverdi. The team advocated for so called source separation, versus mixed dumping in the landfill as recyclable materials become dirty and damaged there. Source separation is an efficient way of waste management; besides, it brings about behavior change among citizens. The then mayor of Alaverdi was not afraid of pioneering with us but at the same time, he was not sure whether citizens would bother to throw different types of garbage in different bins. The next step was awareness raising: programmes on local television, posters, booklets, seminars, events and many more.

"This battle consists of three components. First, you have to create conditions and physical infrastructure – containers, balers, storage facilities, trucks, etc.,"Armine Tukhikyan, Urban Foundation's programme director says, "Second, fostering behaviour change is as important. Citizens have to learn why it is important and commit to change their habits, pitch in and do their part. And last, but not least, work with municipal authorities so they adopt it as a management practice and plan for dealing with separated waste." Now more than two dozens of municipalities work with this model, and considerable amount of plastic waste is accumulated in their storages.

WHAT'S NEXT?

Recycling, indeed. After several months of research, the Urban Foundation found the perfect solution: The plastic waste will be used as a component in producing construction materials according to a simple but new technology in Armenia, popular elsewhere. It was decided to start the recycling plant in Kapan. This project became possible thanks to financial support of the EU and cost-sharing from Armenia's state budget. The municipality of Kapan is a key partner in this project.

Kapan is one of the largest cities in Armenia, which means it produces a lot of plastic waste that could go into the production of polymer-sand mixture. Besides, it is one of the communities where the Urban Foundation had previously implemented waste management programmes, so all the needed infrastructure was already in place. "We made thorough research before we proposed the technology. All details were considered, feasibility was studied, commitments from partner communities to supply plastic waste were solicited, profiles of production line vendors were studied," Samvel Nazaryan, the project coordinator says.

The cost of the project around €750,000 of which more than €500,000 has been provided by the European Union. The project has a strong environmental context not only because it helps reduce plastic waste that end up in the nature, but because environmental management system and operational safety and health system are going to be established in the plant that will pave the way for ISO certification. The project has conducted market research for the construction materials comprising of plastic waste and sand and will support the plant in promoting the products with construction companies and vendors. The plant is Kapan municipality's ownership.

The benefits of this initiatives are evident: garbage is turned into useful products that can be sold for money; The service life of landfills is extended as about 30% of waste is reused, nature gets rid of an alien component contaminating environment.

After visiting the plant this May, the EU Ambassador Petr Switalski was pleased with the result. In his speech he said: "When I saw this proposal submitted for funding I had some misgivings – will it work? And I am really glad that you have proved that it works. I want to credit those who developed the project and wish success in its implementation." The project will create 35 new jobs and provide better economic opportunities for related businesses. Trainings was provided for the new employees who will handle this new technology.

Meanwhile, first batches of curbstones, street tiles, fences, roofing and other construction materials are already produced. They are going to be sent to the communities that supplied the plastic waste to the plant, so that public spaces in those communities are improved to demonstrate the residents what an added value can be received thanks to their effort.

The Urban Foundations' model can be replicated in other places. "It is a good business idea and we will be happy to share the knowledge we have gained. At the same time, we have other great ideas which we are ready to share with communities and help them to realize," Samvel Nazaryan says.

PROPER SOLUTIONS FOR THE PROPER FUTURE

In 2018 Armenia's first sustainable design lab, Proper Plastic, was founded. The company innovatively addresses plastic pollution and waste management, by converting waste plastic materials into commercially viable products while raising environmental awareness. "Proper Plastic" is another chapter for shaping a new mindset for the society in Armenia, leading them care for nature and environment.

TEXT : ANI YAVRENTS / PHOTO : PROPER COMPANY

Marianna Vardanyan, the co-founder of Proper, states that it all started back then in 2016, when the crew came up with a vital idea of building a bridge between creative work and social impact. Despite the fact that growing your own company can be quite challenging, but it allows to create a 'climate of influence' here in Armenia. A few examples of such efforts are organising Armenia's first Social Design Summit, establishing Proper Plastic sustainable design lab and organising PechaKucha Yerevan Nights.

One of the most vital challenges that the world faces every single day is the rapid intrusion into non-biodegradable waste. According to the United Nations, international plastic production has ballooned nearly 300 times in the last 65 years. A majority of wasted plastic makes it into the global water stream, eventually leading to our oceans where it forms massive, immortal islands of trash. To fight that you need to be creative. Proper Plastic is currently researching and exploring ways to create long term sustainable design products from single use plastic. The company works in 3 directions mainly: upcycling, education, community-building.

Smart Eco-Table made from recycled plastic

Proper Plastic's anti-plastic campaign

WE ARE COLLECTING TYPE 2 HDPE PLASTIC (HIGH DENSITY POLYETHYLENE). SO OUR FIRST PROTOTYPE WAS AN ECO TABLE, AS WE CALL IT, A SMART ECO TABLE, WHICH IS EQUIPPED WITH TWO SOLAR PANELS

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Social Design Summit was the first one of its kind to bring together speakers from six countries to discuss how cross-disciplinary collaboration, digital tools and practical approaches can all combine with design thinking to deliver real and lasting social change. PechaKucha Nights is a global network of 1,200 cities holding themed presentation events. It has a simple presentation format where people show 20 images, each for 20 seconds. The images advance automatically and you talk along to the images. PechaKucha nights are one of those focal points of the link between creative youngsters and unexplored information.
Some of the topics covered during PechaKucha nights are social innovation, applying best practices from business and tech on public governance, designing more human-centered cities, improving innovation ecosystem in Armenia, the future of modern parenting and more. On 2018, PechaKucha hosted an event “Living Green,” bringing together self-starters who made an active difference to improving the environment. This was the first step of turning “green initiatives” into real actions.

But what makes Marianna and her colleagues even more proud, is creating new products: “We are collecting type 2 HDPE plastic (high density polyethylene). So our first prototype was an eco table, as we call it, a smart eco table, which is equipped with two solar panels.” The table was exhibited at the UNDP Green Initiative Urban installation, the first zero-waste installation. ‘Green Initiatives’ is a series of events, installations and artworks based on thinking, going and living green. It was designed to inspire people to make positive changes to how we use the Earth’s resources, with the focus on three vital areas: Climate Change, Loss of Biodiversity, and Soil Degradation. The space was divided into several places. The ‘Green Pavilion’ created in cooperation with SNKH architectural studio, was a big, open air “apartment” on Northern Avenue that gave the opportunity to examine the sustainable lifestyle of the future, by standing in the present. Some of ‘rooms’ of this open air apartment demonstrated furniture made from upcycled plastic. The visitors had a chance to recharge their devices from a solar panel and etc.

Green Initiatives:
Zero-Waste Pavilion
designed with snkh studio

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In the 1960s, in the UK, a lot of designers came together to sign a manifesto, covering their vision: the design industry should serve wider topics than advertising and selling products. Thus, the main notion of signing the manifesto was to put more effort into wider realms like social, environmental, health and other aspects of the economy. Nowadays, after 60 years, Marianna still notes that there's a perception in Armenia that creative industries are either for leisure or for commercial and advertising work. So since the very beginning, for the agency it was important to work with clients that have their own positive impact in Armenia.

"We started experimenting with different formats: doing workshops for younger designers and trying to explore how we can integrate this capacity and the potential of creative industry to address wider social issues," Marianna says.

Throughout 2018 Proper company has been working with UNDP's environmental department, organizing public awareness campaigns, covering topics like biodiversity, soil degradation and climate change, which led them to the realization of the huge scale of environmental catastrophes that the world is facing today. Moreover, the UN has estimated that people only have 17 years to tackle climate change and after that the actions will not be reversible.

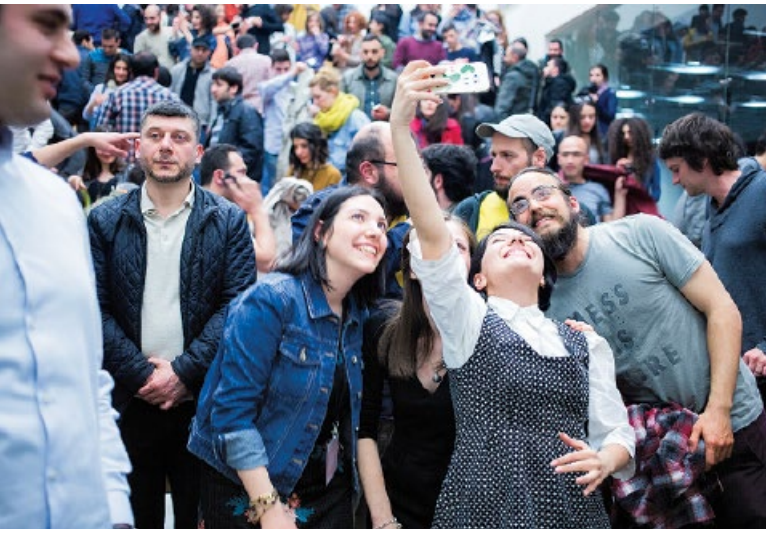
Accordingly, Marianna claims "So basically there's just 17 years left and learning about these factors of biodiversity, soil degradation, climate change and also energy efficiency - and also doing work around waste management and waste prevention, had led us to start our own startup, 'Proper Plastic'."

Zanazan Alphabet magnet set by Proper Company

PechaKucha Yerevan

WE STARTED EXPERIMENTING WITH DIFFERENT FORMATS: DOING WORKSHOPS FOR YOUNGER DESIGNERS AND TRYING TO EXPLORE HOW WE CAN INTEGRATE THE POTENTIAL OF CREATIVE INDUSTRY TO ADDRESS WIDER SOCIAL ISSUES

Marianna Mishoyan (in the middle) during PechaKucha Yerevan



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Marianna mentions that this spring they have teamed up with Global Shapers Yerevan Hub and Revolve Consulting, to organize a public event for school children to educate them on the principles of circular economy and waste prevention. Nearly 200 students, from 5 public and private schools were participating in these one-hour workshops in their schools, which was then followed by gathering in Mashtots Park and doing color separation, which is the first phase of the upcycling process.

The aim of the project was to raise awareness and understanding of the problems caused by plastic misuse, encourage and support others to become “Green Heroes,” empower kids and young people to believe they can make significant change, even at an individual level.

Despite the technical and logistical challenges, Proper Plastic company continues to grow shaping the ideal figure of networking communities. For this moment, the company is in the phase of experimenting with materials and moulds, aiming to build long lasting items.

“Sustainable Design for a Better Future” – this is what makes the company grow, no matter how hard the challenges may be. “Proper Plastic” seems to be the first step to an eco-friendly environment normalizing the notion of caring about nature.

ENERGY CHALLENGES IN RURAL ARMENIA

TEXT : IBiS / PHOTO : GIZ

During the recent decades the use of fuelwood and dung for heating and cooking purposes has been a common practice in the rural households of Armenia. Unsustainable production and inefficient use of these fuels is linked to different areas including household economics, health, energy, and forests. Excessive use of fuelwood has negative consequences for human well-being and forests. There is a need to increase the efficiency of households' heating as well as to explore and promote the alternatives. This will help to conserve the limited forest resources of Armenia for future generations and improve the livelihoods in rural Armenia.

Natural gas makes the highest proportion in the total energy supply profile of Armenia. Gas is imported from Russia (80-85%) and Iran (15-20%). The other energy sources are nuclear power, followed by oil, hydropower and biomass. Thus, the Armenian energy sector highly depends on imports. With an officially reported share of only 4-6%, biomass (including fuelwood) seems to have minor contribution to the Armenia's overall energy mix. And yet, it is worth to have a closer look.

Although nearly all communities have access to natural gas, it is rarely used in rural households for heating during the winter. Over the past fifteen years, prices for gas and electricity have increased substantially, posing a problem especially for low-income households. As a result, the demand for fuelwood as an attractive alternative heating source has increased dramatically. The demand for fuelwood exceeds by far the supply of fuelwood that can be ensured by the growth of forests. It leads to forest degradation, which poses serious threats to the forest ecosystems including soil erosion, disturbance of hydrological balance, and other. Local residents report that it is expensive to buy fuelwood from the forest enterprise. In forest adjacent communities, people are entitled to collect up to 8 cubic meters of dead wood per household by themselves free of charge. The designated areas are remote and not easily accessible by vehicle. Nevertheless, fuelwood remains the most affordable and attractive fuel source in many villages. Recent surveys show that heating costs constitute up to 20% of household incomes, depending on the heating option. Still, heating is perceived as an inefficient, insufficient, and uncomfortable process, especially in rural households. Often houses are heated partially, and lots of heat is being lost because of different reasons. In addition, preparation of fuelwood and dung for heating is time and work consuming.

In this respect, the practice of using moist fuelwood is one of the important issues to be addressed. It is not only inefficient, but also causes indoor air pollution. In many cases, people also burn plastic, rubber and other waste in the stoves, producing toxic emissions.

Women and children are particularly vulnerable, since they spend comparatively more time at home close to the stove and can suffer from respiratory problems and intoxication.
Apart from fuelwood, animal dung is used as energy source, especially in non-forested regions. It is available for free, dried and piled up close to most rural households that own livestock. Burning dung means that it can no longer be used as valuable organic fertilizer. This can lead to decreased soil fertility, with a negative impact on pastures and agricultural productivity.
To address the multiple challenges related to rural energy, several fields of action have been identified, on the supply and the demand side. First of all, raising awareness and knowledge on energy-related topics among the population is a precondition for further actions. Measures to ensure a sufficient level of forest protection and control are required to prevent unauthorized fuelwood supply. Promotion of sustainable forest management principles and practices is another important aspect to be considered. Still, without the provision of feasible alternatives to rural communities the issue of excessive use of fuelwood can hardly be addressed. Thereby, options to increase energy efficiency at household level, such as the use of dry fuelwood, improved stoves and thermal insulation measures need to be promoted. The production of pellets and briquettes from woody biomass or other agricultural residues as alternative fuel materials should be supported and extended to other areas. Despite its growth over the past few years, the market for renewable energy appliances (e.g., solar water heaters, solar panels for electricity generation) still has a huge potential for expansion.
A smart energy policy is needed, considering affordable financing and incentives for energy end-users, public-private partnerships, etc. To achieve the desired changes, it is necessary to invest in people, in their education and talent.
Looking at these diverse options, there is another important aspect to be considered: women play an important role in energy decisions at household level and can be powerful catalysts of change. For example, the regulation of air temperature in the house, determining the consumed amount of fuelwood and other household tasks are mostly under women's control. Educating and enabling women as change makers can have great influence on the energy consumption habits of their children, who will shape the future generation.
Within its focus on sustainable management of natural resources, the GIZ supported ECOserve programme, that started recently, provides opportunities to tackle some of the challenges related to rural energy.
A good example for practical measures are the two schools in Nahapetavan (Aragatsotn region) and Saralanj (Shirak region) – winners of ECOserve's "Green Idea Contest." Until now, these schools have been using diesel to heat the classrooms during the winter. This is not only dangerous in terms of fire risk, but it also produces toxic emissions that impact the health of children and teachers. The selected schools receive support for the establishment of solar panels, which will produce electricity to heat the elementary class rooms and cafeteria.
In general, coordinated actions at different levels are needed to address the current energy challenges in rural Armenia. This will not only reduce the pressure on already limited forest resources but will also improve the livelihoods of the rural population. ◆

Film "Energy Challenges in Rural Armenia"
https://www.youtube.com/watch?v=ktj6VWktd7I

INTEGRATING ENERGY EFFICIENCY CULTURE IN THE BUILDING SECTOR OF ARMENIA

The largest final energy consumer in Armenia is the residential sector (over 38 % in 2016). Thus, it's among the top priorities of the country when it comes to climate change mitigation. The climate of the country contributes to this tendency with an extended period of heating. With improvement of the economic situation in the country the greenhouse gas emissions from residential sector increased six fold in 2016 (1170 GgCO2eq) compared to 2000. The energy efficiency is one of priority areas of national policy and was in the focus of UNDP programmes. In the past years various projects were implemented all across the country. Regional Post discussed the latest project aimed at scaling up investments in energy efficient building retrofits with the manager of the project, Vahram Jalalyan.

TEXT : MARGARIT MIRZOYAN / PHOTO : UNDP

Energy efficiency in the residential sector has been at the spotlight of UNDP Armenia since 2010 with its first major project "Improving Energy Efficiency in Buildings." The project was financed by the Global Environment Facility (GEF) aimed at showcasing the expertise in energy efficiency from the technical perspective. It also had legal, educational, awareness-raising components. In the six years of its operation, the project achieved a considerable number of advancements. The first energy efficient retrofit of multi-apartment building in the country was introduced in district of Avan, Yerevan. In the framework of cooperation of Swiss Development Agency with the government, a social house in city of Goris has been constructed in 2012. The UNDP project contributed with integration of energy efficiency measures in the design and construction stages, resulting in 60% energy savings. In "Cascade Hills" residential complex, the recommended inclusion of energy efficiency ensured 40% savings, as well as expansion of the living area in buildings by 900 m^2 generating additional value of ~ USD 1.5 mln for the developer. The similar energy efficient measures were introduced during the construction of the residential buildings in Akhuryan community under state housing programme.

"When the project began, there were no laboratories in the country to test thermal insulation materials and we had to transfer all these materials to Russia for testing, which was a massive obstacle for the advancement of the field," remembers Mr. Jalalyan, "Eventually, we decided to purchase specialized equipment and establish testing laboratories in

Energy efficient retrofitted residential building in Avan administrative district of Yerevan, next to similar non-retrofitted one. Same view with thermal imaging camera.

Vahram Jalalyan, Project Manager
De-Risking and Scaling-up Investment
in Energy Efficient Building Retrofits
UNDP-GCF Project

Armenia." One in the National University of Architecture and Construction for educational purposes and the other one in the specialized accredited private company.
One of the critical components of the project was the improvement of the legal framework. The building codes relating to the energy efficiency were developed/renewed and adopted by Government in 2013-2016, besides that several European standards were adapted.
The project considers as key obstacle the weak management system for the multi-apartment residential buildings. By Prime Minister's decree a working group was established with a task to develop a new law on multi-apartment building management. Currently, Armenia has two relevant laws but none of them is properly enforced. UNDP supported the process with engagement of international experts and organizing study tour for key stakeholders to Estonia, as a country close to Armenia by its scale and similar building stock. Estonia has a successful experience in energy efficiency retrofitting and management of multi-apartment buildings after the collapse of the USSR.

View of the lobby of the Erebuni youth and creativity center before and after retrofit.

Boiler house before
and after retrofit

WHEN THE PROJECT BEGAN, THERE WERE NO LABORATORIES IN THE COUNTRY TO TEST THERMAL INSULATION MATERIALS AND WE HAD TO TRANSFER ALL THESE MATERIALS TO RUSSIA FOR TESTING

"Today, the management bodies of residential buildings don't enjoy trust of the people, and for many subjective reasons the residents refuse to invest in the well-being of their building," says Mr. Jalalyan, "People don't feel ownership for the building, just like for the car: the roof, the basement with its rats, garbage and even the smell, as well the lifespan of the building." In the ideal world to improve energy efficiency in the building, its management body in consultation with residents is deciding on investments in the building, for example, to thermally insulate the building and acquiring loans for that. Then, the same management body hires design/construction firm, which renews the building and the repayment of the loan is ensured from resulting savings. It's a simple logic, which doesn't work in Armenia as, previously, the management of the buildings was highly politicized, and their reputation went beyond them. Another reason for the ineffectiveness of building management bodies is the simple "egg and hen" paradigm – residents are not paying building's operation and maintenance fee to the management, which consequently, refuses to do execute their function.

View of the dance hall in Erebuni youth and creativity center before and after energy efficient retrofitting

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In 2017, UNDP narrowed down its focus to investment scaling-up processes in the energy efficiency of the building retrofits, in the frame of the new six-year project "De-risking and Scaling-up Investment in Energy Efficient Building Retrofits" implemented by UNDP under the coordination of the Ministry of Environment of the Republic of Armenia. The project will lead to tangible energy savings and reduction of greenhouse gas emissions with its target on multi-apartment, single-family individual houses and public buildings. The project has four components. The first one is the MRV – Measuring, Reporting and Verification system creation, which will enable the monitoring of the energy flows in the buildings and organize the monetization of the savings achieved, making the process measurable, transparent and affordable. The first component also involves awareness-raising activities. The second and third components are dealing with the policy de-risking and financial de-risking, correspondingly covering the lack of an appropriate legal background and financial mechanism and identifying the obstacles preventing these schemes from working. The fourth component refers to the Financial Incentives, with its primary

View of the Erebuni youth and creativity center building from backyard before and after energy efficient retrofitting

focus on targeted subsidies to ensure that the most vulnerable households can afford energy efficiency retrofits.
The project had received a USD 20-million grant from the Green Climate Fund. In addition to that there's also an amount of combined co-financing from Yerevan Municipality (around USD 8 mln), the government of Armenia (USD 400,000), UNDP (USD 420,000) and parallel financing from International Financial Institutions. Roughly, USD 6 million from the grant funding covers the first three components of the project, and the remaining USD 14 million is allocated within the fourth component only, i.e., the targeted subsidies. The funding can cover in average 20-40 percent of the amount needed for the energy efficient retrofit of residential buildings, up to 20 percent for public buildings and 10 percent for private houses.

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In cooperation with the Municipality of Yerevan, the project is providing the technical support for improving energy efficiency of about 50 kindergartens, Erebuni youth and children's creativity center, also to "Muratsan" hospital, Agricultural Academy and others. Currently, the project partners with around ten design companies working on several projects. All these processes are overlooked by the relevant expert team, with all the highly-professional specialists, including

View of the gymnastics hall before and after energy efficiency retrofit in Erebuni youth and creativity center

IN 2017, UNDP NARROWED DOWN ITS FOCUS TO INVESTMENT SCALING-UP PROCESSES IN THE ENERGY EFFICIENCY OF THE BUILDING RETROFITS, IN THE FRAME OF THE NEW SIX-YEAR PROJECT

construction architects and engineers, heating and air conditioning specialists, renewable energy specialists, energy auditors, which is, by the way, a new term in Armenia.
Overall around 150 kindergartens will be involved in the project, from which around 50 will go for deep renovation and the other ~100 will be subject for introduction of so-called "horizontal measures," in other words not invasive. In 2018, the Yerevan municipality received a loan of EUR 7 mln from European Investment Bank for public buildings' restoration accompanied with a grant of EUR 5 mln from E5P for the horizontal measures. The municipality also committed to invest from its own budget and UNDP decided to join and provide technical assistance of around EUR 1 mln.
As a continuation of the previous project, UNDP cooperated with the RA Urban Development Committee on improving legal framework, namely the development of multi-apartment building operation and maintenance rules. The other initiative is the creation of the building passport form. Both initiatives are finalized and submitted to UDC. "This practice was common in Soviet times; however, in today's Armenia it became tough to receive accurate information about a specific building as there's no centralized database or document pack," indicated Mr. Jalalyan. To create this document, the experts should come, evaluate the technical state of the building to compile its capital and current renovation history. The passport should include the necessary information about the building, its management body, and residents, etc. Eventually, the passport becomes one complete document for which the next step will be the creation of buildings' digital database.
Additionally, an operation manual is developed for work with the public buildings, and currently, they are working on another scheme for the residential buildings, which is a much harder part of the project. It's easier to work with public buildings where there's only one beneficiary, consequently, one decision-maker. "The residential buildings have a number of shortcomings, namely the issue of building management body and collective decision-making, implies Mr. Jalalyan, "In Europe, it's possible for the residents to have soft loans for their building, benefit from EU accession funds but in Armenia, we don't have it."
Besides all the above-mentioned goals and targets, one of the most important parts of the project is to make it self-sustaining in the future. In the upcoming years, the practices developed during the project can become a part of the governmental protocol and serve as a guideline for scaling up the building energy efficient retrofits.

SOLARON:

"SOLAR POWER IS THE BEST CHOICE AND SOLUTION IN EVERY FIELD"

Alternative energy sources become a huge and important trend in today's world. Armenia with its climate and sunny weather is already doing its own share, with booming in solar energy market. We talked about perspectives and importance of the field with the head of SolarOn Artur Alaverdyan, first company in Armenia to manufacture solar batteries.

INTERVIEW : AREG DAVTYAN / PHOTO : SOLARON

Mr. Alaverdyan, why is it important for the world to use alternative energy sources?

— The development of human civilization cannot be imagined without sources of cheap and affordable energy. Since the time when the energy of human muscles was replaced with the energy of animals (horses, bulls, elephants), then with the energy of fire and steam, next with the energy of hydrocarbon fuel, the human being tried to extract more and more energy from the available substance, and this process will be continued. "Alternative" energy sources are not new, even in ancient times people used the energy of water and wind, for example, watermills and windmills. Now humanity is living in the era of the 4th industrial revolution, and here, one of the key areas is the transformation of hydrocarbon-based energetic to renewable. The rapid development of modern technologies has led to a sharp reduction of the cost of solar and wind energy, and along with the global warming challenges facing humanity, hydrocarbon and nuclear energy are being replaced worldwide by environmentally friendly, affordable and cheap energy sources - the sun, wind and others.

Solaron's history is dating back to 2012. Where did this idea come from? Is it a business idea, or something more?

— We have been engaged in energy-efficient technologies for more than 15 years and this idea has matured for a long time, however, its implementation only began in 2016, as certain favorable market, country and legislative factors developed. The idea comes from the company's mission – to become a catalyst for the development of the solar energy industry in Armenia and in the long term to contribute to the transformation of Armenia's energetics to its own resources – the sun, wind, along with the existing developed hydropower.

Knowing how many sunny days there are in Armenia it seems quite logical to do solar panel business here, but it seems that it cannot be the only pillar to base the project on. What else do you need to create such an ambitious project?

— To start such a project, you need a long-term vision of 15-20 years, an understanding of the trends in the science and technology development, people with extensive experience in creating and developing innovative industries, the desire to use gained knowledge and experience in creating an innovative economy to transform Armenia into a developed modern country.

Was it easy to find specialists for the fields that is quite new for Armenia?

— No, this is not easy, but there are many ambitious young people in Armenia who are ready and willing to learn new things, who are able to learn new specializations, open to the world and new opportunities. We rely on such people, they form the backbone of our team, the results of the past three years inspire us, and we are optimistic about the future.

What is the best way to use solar panels, particularly Solaron's production: private houses, multi apartments, public spaces?

— Solar power has gained a lot of interest over the last few years in Armenia and it has become increasingly popular both for residential and commercial markets. The use of solar power is the best choice and solution in every field. They are designed to reduce electricity bill as you will require less electricity from the power grid. Renewable energy systems are practical, reliable, productive for people and

Solar panel manufacturer in Armenia

Founder of SolarOn
Artur Alaverdyan

for the environment. SolarOn provides ready-made, customized solutions, taking into account the clients' needs, interests and requirements. We are specialized in offering ground based and rooftop applications for home-owners and corporate customers and have already implemented number of projects in all over Armenia. SolarOn is not only manufacturing company but service provider. Life long service is one of the key points which suppose taking care of solar modules throughout life (from installation till utilization). Besides we implement extended 24 hour monitoring system and look after power plant performance starting its connection to the grid.
Separate direction of our activities is BIPV (building integrated photovoltaics) – solar panels integrated into the architecture of the building. In BIPV, PV modules are components of the building materials, an integral part of the building structure and, at the same time, part of the overall architectural image of the building. This innovative sector of the construction industry requires the joint creative work of architects, planners, designers, engineers and manufacturers of photovoltaic modules.

Solaron is the only producer of solar panels in Armenia. Why so? Do you think this field will emerge by time?

— It's true that we are the first and only manufacturer of solar panels in Armenia so far. Perhaps this is just by chance, there is always someone who is the most passionate, ready to be a pioneer and lead the rest. However, we are sure that our example will inspire other entrepreneurs and businessmen to start similar enterprises in Armenia and there is already news about two such expected projects. We are also confident that the direction of solar energy, both production and generation, is very promising for the country's economy and can attract multibillion investments to the economy of Armenian.

On your website, we can see that one of Solaron's main goals is the popularization of the idea of solar energy in the country. What kind of activities are you doing for this?

— Carbon-based energy around the world tends to transform into renewable green technologies. We hope that the development of Armenia should be in line with these trends and we are now developing our vision to make Armenia 100% solar powered. This is how we see our future, and do our best to spread renewable energy…
We have created and launched "Solar Ambassador Program." This is a business training course for our partners and interested bodies who are ready to cooperate with us, want to start a business or are already involved in solar power plant installation business. The aim of the project is to build a team of solar ambassadors from different regions, provinces, who aspire to outspread the ideas of renewable energy and business development in Armenia. The programme begins with the relevant training and provision of necessary tools and skills, which can help to organize proper sales and installation works. The course provides not only theoretical materials, but also includes practical work, visit to our factory and site-visit. Our company also collaborates with schools and universities and regularly host young students. We also have an internship programme for young professionals. SolarOn hosted students not only from couple of universities from Armenia, AYB school, but also from Munich and US universities who successfully implemented their projects and made presentations.
Recently, in parallel with the Constitution Day of the Republic of Armenia SolarOn organized the "Day of the Sun" public event in Swan Lake. The main aim was to highlight the importance of the sun among renewable energy sources, rise the interest and information on environmental protection, solar energy. Throughout the celebration, Armenian physicists and chemists conducted various scientific experiments using exclusively solar energy, presenting its potential and advantages. Today the public needs to be aware of the free energy source given to us, and our initiative is about to show, that sun can give more than we usually take. It is a truly efficient and profitable source of energy, which, we think, should be the future of Armenia's energy sector.

Do you think in the near future the world and Armenia will fully move to renewable energy sources?

— I am absolutely sure of this, humanity and Armenia as part of it have no other chance to fight global warming and to ensure their ever-increasing energy consumption, but to use free resources such as sun, wind, sea waves and flows, etc. However, science and technology do not stand, in the future it will also be possible industrial use of thermonuclear fusion energy, while in the distant future more efficient ways of extracting energy from substance will be invented.

ECOFARM BY ICARE

Let's nurture minds of the Armenian youth in understanding and appreciating nature, and incubating agribusiness startups. That's why a unique project of EcoFarm was founded by the International Center for Agribusiness Research and Education.

Armenians are innovative, creative and entrepreneurial. Over the past two decades tens of thousands young Armenians left the country in a search for better jobs and lives of better quality. Armenia has been losing brainpower from the generation of youth who are supposed to be the driving force of the country today and in the years to come. That's why today we need to create more change-makers in Armenia and for Armenia.

Career in agriculture is probably the least what comes to the mind of youth in Armenia nowadays. Previously imports and exports of goods couldn't be conducted smoothly due to the bureaucratic procedure and lack of transparency. You write a software code, you send it to the client via email, you receive the money on the virtual wallet. That used to be a no-hassle business.

Things are different when you want to engage in primary agriculture production or processing. Launching a local company would assume an array of paperwork. And if you wanted to import technology or inputs for your production and export the ready products, then things would have gotten much more complicated. Yet, there are now positive developments in the market structure with more room and freedom for small and medium enterprises to maneuver and capture opportunities.

"Oh no, no agriculture! a doctor, a lawyer, or at least a software developer is what will ensure a comfortable life for your family, my son" would say to their kid the Armenian parents. Our society does not perceive agriculture as a good career path, and that is probably true for many other societies. And why the Armenian parents would discourage their children from pursuing this career path, is because there are now more than 300 thousand farmers in the country, many of them hardly earning their living. Many depend on foreign remittances coming from their family members from all over the globe.

Can agriculture be highly profitable? That is a question asked even by countries with well-established agricultural sector. Agriculture constitutes around 18% of Armenian GDP. This may sound like a big number, compared to below 5% of agriculture contribution to GDP in many developed countries. Yet, it is high in Armenia, because other sectors of the economy are not as advanced as in developed countries. In addition, our agriculture system is greatly inefficient often due to a lack of management capacity. And way before we need new technologies in the sector, we need people who can efficiently utilize those technologies, and give freedom to their creativity and entrepreneurship spirit.

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ICARE was established in Armenia in 2005 by Texas A&M University to educate agribusiness managers equipped with up-to-date knowledge in management, marketing, finance, and last but not least soft skills, networking and communication. This institution matriculated around 700 graduates from its agribusiness and marketing, winemaking and wine business, greenhouses management, and other agribusiness-related programmes. All graduates find professional employment within only a few months after graduation. Being able to fully meet the industry needs for professionals, majority of the graduates stay and work in Armenia because they can ensure comfortable lives for themselves and their families. These graduates are among the change-makers of Armenia.

We see an increasing trend among youth, especially in the capital city of Yerevan, who visualize their every business idea through the prism of technology. So, we thought how ICARE can on one hand fulfill the greed for technology among youth, and on the other hand nurture their minds for environmentally conscious and profitable agriculture. ICARE team had four pillars for brainstorming – agriculture, environment, technology, business. And here it comes – EcoFarm! a hallmark for "Learn by Doing" agricultural technology and agribusiness incubation center, promoting environmentally conscious agriculture, healthy lifestyle, and nature appreciation. And where else could such a center be located if not in the outskirts of Yerevan, as the first offshoot with a potential to grow satellites around Armenia.

Next comes defining the structure and activities for the EcoFarm. Having in mind the four pillars, EcoFarm will provide agribusiness incubation opportunities for ICARE students and all other students and young professionals who are passionate about establishing their agribusiness start-ups. EcoFarm will also be an agribusiness incubator in Armenia! The agribusiness start-ups incubated at EcoFarm will incorporate components of high-tech farming, organic farming, or biodynamic farming.

For those who live in Yerevan it is impossible to find a place near the city for hobby farming after a hard week in the office, unless one has a relative in a nearby village. And if you are the lucky one with such an opportunity, there is a high chance you will be spending the weekend in a company of all your noisy relatives running around you and laying a table morning to evening. And this does not come without firm persuasion that you got really thin and you need to gain a few pounds by devouring tasty dolma, harissa, ghapama and all other amazing dishes that Armenian cuisine is so rich with. But all this gastronomy experience comes only if you are the lucky one to be able to have village relatives close enough to visit over the weekend. And farming? No way! They won't let you do that dirty work! So, if you live and work in Yerevan, your opportunities for outdoor healthy lifestyle are limited to jogging in the city center or exercising in the balcony under scrutiny of the neighbors. EcoFarm will provide an opportunity for active farming work in only 10 minutes' drive time from downtown Yerevan.

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A new word emerged recently – screen-time. This is the time a person spends every day working or playing on a computer or a phone, or interacting with any other gadget. And this is getting really a sensitive issue when we talk about kids. Kids who live in cities have way more screen-time hours than those who live in villages. To reduce the screen-time, we need to engage them in entertaining activities, ideally on a farm. Driving only 10 minutes from Yerevan and bringing your kids to a farm where they can interact with small animals, water their own lettuce plants, harvest their own melon, pick apricots or blueberries. Is there any better gift for a kid that a caring parent can make? EcoFarm will be exactly this facility!

We invite you to join the efforts and start this amazing project this year. Let's create a hallmark for nurturing children's minds to become conscious about nature and agriculture. Let's embrace those entrepreneurial minds who want to establish their agribusiness startups. Let's help students who want to learn by doing! Let's make our nation healthier and happier. Because we are Armenians. Because we can. Together. ◆

Off the RECord:

REC Caucasus Regional Mandate Covering the Topic of Ecosystem Services in the South Caucasus

Natural heritage is precious and irreplaceable. Restoring and conserving our unique ecosystems needs our significant efforts and daily attention. We also need environmental actors, professionals to implement targeted efforts conserving the ecosystems and the natural heritage of the region. REC Caucasus is one of the key players behind numerous projects when it comes to environmental issues in the Caucasus region. Regional Environmental Center for the Caucasus (REC Caucasus) was established back in 1999 by the EU and the Governments of Armenia, Georgia, and Azerbaijan in the frame of "Environment for Europe Process." The primary goal of the center is to work towards the solution of environmental issues in the region and serve as a bridge among the stakeholders to achieve maximum efficiency. The development of civil society in the three states is another mission of this regional organization. We talked to Ms. Nune Harutyunyan, Executive Director of REC Caucasus about the regional mandate of the organization with a particular focus on ecosystem services.

INTERVIEW : MARGARIT MIRZOYAN / PHOTO : REC CAUCASUS

What are the results achieved by REC Caucasus on the regional level with a particular focus on ecosystem services?

— In 2009, we started implementing the "Support development of biodiversity conservation policies and practices in the mountainous regions of the South Caucasus" (TEEB) project. This was a pilot project, which was one of the first initiatives to introduce the idea of ecosystems in the region. The project was implemented in close cooperation with governments, civil society and scientific sector with a primary goal to build capacity in local communities to address biodiversity loss in forest ecosystems of the South Caucasus, and to raise awareness about the possibility of sustainable use of these ecosystems. It was financed from the grants of the Foreign Affairs Ministry of Norway. We analyzed the spectrum of ecosystem services we could have in Armenia, Georgia, and Azerbaijan and conducted several national and regional trainings, conferences and discussions, which resulted in the emergence of the idea to have a comprehensive regional platform. All three countries included in the project had the issue of biodiversity conservation in the mountainous regions, and in all of them there was a lack of awareness regarding EU environmental projects methodologies. Besides, there were very few economists\ecologists who could understand the valuation models of ecosystem services. In the last meeting in the frame of the project we discussed how we could promote ecosystem services and in which directions. One of the proposed ideas was about starting to use the non-timber forest products and the development of small and medium businesses in the communities, which would create work opportunities for the locals who, in their turn, would be eager to conserve nature from the economic perspective. In the three countries, afforestation and reforestation operations were initiated. We have also prepared the mapping of ecosystem services represented through GIS mapping tools. These are quite actual for more precise forest mapping in communities where we have actually worked and restored the forest.

Are these three countries the only participants in the projects?

— In most of the cases all three South Caucasus countries are participating in the regional projects and this is the main idea behind cooperation platforms of RECC. We had another project on community forest management, which was again financed by EU. The project was called "Fostering community forest policy and practice in mountainous regions of the Caucasus" and, this time, Russia was among the participants. The overall objective of the project was to initiate a discussion on legal, technical and institutional systems of community forest management. It also aimed to demonstrate the best methods of reforestation and restoration of the areas damaged as a result of various natural disasters and undertake climate change adaptation in selected communities. Finally, the project had a mission to conduct capacity building and awareness raising initiatives for the ones who are responsible for the forest management.

Interestingly, you have involved countries that are in conflict with each other: Georgia and Russia, Armenia and Azerbaijan...

— Indeed, however, cooperation succeeded. Adygea, Shahriyar, Racha and Tavush regions were selected, and together with our colleagues we conducted afforestation and reforestation measures as well as many visits and hands-on trainings on recovering the forests. We also developed a national guideline on community reforestation models, indicating how to manage forests and what practical knowledge is required for that. We also had a community forest management model regional guideline, which we developed with Mike Garford, who is an English specialist with profound experience. With the support of GIZ, we organized experience exchange study visits to the Hessen region, Germany, where we had a practical opportunity to study the model of community forest management used in there. The forest management model in their country is integrated into economic mechanisms and we can use these methods if we

decide to have planted forests for business purposes. The main idea behind conservation and forest use is having a balanced approach, which allows foresters to plan and restore forest and limit its use for industrial purposes within legal and logical framework beneficial for society. We also have to keep in mind that the model is applicable for industrial forest use, while in our case, most of our forests have extreme biodiversity value in South Caucasus, since our region is one of the most unique biodiversity hotspots on this planet.

What are the challenges of working with the communities?

— First, it's the lack of awareness regarding the importance of biodiversity and forest conservation. Then, there's the lack of enforcement mechanisms for professional institutions which deal with control, monitoring, and data collection. Well, if we try to make the principles related to ecosystem services more practical, it might begin to work in some areas. People should understand that nature can help to upscale the economic conditions such as development of tourism and ecotourism. Environmental protection is not merely the function of the relevant ministry – it should be a process integrated across different bodies such as the RA Ministry of Territorial Administration and Infrastructure, the Urban Development Committee, the local self-government bodies, just to name a few. In terms of ecotourism, the RA Ministry of Emergency Situations should also be involved to ensure the safety of tours around the country. The Ministry of Agriculture, farmers and companies dealing with agribusiness: they all can take part in the successful organization of the community life. There is a need for an integrated and multifaceted approach. Another challenge is the condition of forests. Forests play a crucial role in helping us to adapt to climate change. We need to remember how vulnerable are forests. They get burned and it's hard to recover the forest cover. Decades are required to plant new trees, improve the soil, ensure watering and protection from diseases. Here again, the awareness plays a huge role for security and safety of forests, and protection from man-made disasters. So, there's a massive importance of community involvement and ownership. For this purpose, we developed informative packs which we handed over to all the stakeholders, working with them for 8 years and explaining the value of forests and opportunities for small and medium business development for neighboring communities. Also, we produced a social video clip on the topic.

Did any of your projects in the region address the issue of land degradation?

— Yes, we had a regional project addressing this issue. Three countries teamed up to collect and examine the problems connected to soil degradation. Eventually, we came up with a report on the Analysis of Soil Erosion, where the causal link is described as well as the agricultural aspect and the soil pollution. The report was presented during our regional meeting. In the frame of the project, several other pilot initiatives were conducted in cooperation with several NGOs. As a result, Sustainable Land Management for Mitigating Land Degradation and Reducing Poverty in the South Caucasus Region report was compiled which later served as a basis for many other pilot initiatives. The report covered policy planning and regulatory policies, sustainable land use, socio-economic factors analysis, integrated natural resource management practical models and so on. We also developed sustainable land management plans, discussed them with LSGs and adapted to the needs and specificities of the communities. We study the EU's experience in relation to land-use and land degradation. There are bilateral action plans that comply with EU documents and guidelines, which we tried to employ in 16 communities. In Tumanyan, Alaverdi and Aghtala communities in Armenia and several other communities in Georgia. 12 pilot projects have been implemented.

Tell us about the purpose of the conference in Georgia and the results of this regional meeting.

— In 2017, in cooperation with GIZ, we conducted the "Media workshop for environmental journalists on land degradation topics." As a result, journalists from all three countries learned about the concept of integrated biodiversity management. The issues related to soil erosion, degradation and further needs

for professional training of media journalists were discussed. Representatives from the Ministry of Nature Protection, UNCCD and national UNCCD focal points attended the conference. The event also enabled many professionals to connect strengthening the network among them.

Nune Harutyunyan, Executive Director of REC Caucasus

What about agrobiodiversity, climate change? Are these concepts of your particular focus in the frame of the regional mandate?

— We had a project related to agro biodiversity, involving several trainings and pilot projects. REC Caucasus has been one of the pioneers in the region of South Caucasus in terms of support to conservation of agro biodiversity. This initiative was funded by the EU and received support from GIZ through the IBiS regional programme The most important output of the project was the development of vulnerability profiles for climate change adaptation for South Caucasus countries and communities representing vulnerable points related to climate change and agro biological diversity. Later became a part of Georgia's 2nd National Communication of climate change. We also had the document in our Armenian 3rd National Communication prepared by UNDP and in the 2nd communication of UNFCCC. The project was designed for arid and semi-arid regions. In Armenia, we implemented it in Vayots Dzor and in other three communities. In terms of climate change, we worked on "Regional Approaches on Climate Change" which is an interesting platform, addressing the identification and implementation of adaptation response to climate change impact for the conservation and sustainable use of agro biodiversity in arid and semi-arid ecosystems of the South Caucasus. However, the studies would need an updated data to restart the works, and conduct new pilot projects practicing new adaptation ideas for agro-biodiversity conservation.

What about the upcoming and ongoing projects? What are you currently up to?

— Recently, we had a project related to Green Economy, again a regional one. "Regional Resource-Efficient and Cleaner Production Demonstration" programme, which was funded by European Union in collaboration with UNIDO. The project took place in 2014-2017 and currently the project is launched again. Overall, the objective of the project was to improve the "environmentally responsible" performance and productivity of businesses and other organizations in the target industry sectors of the Eastern Partnership Economies. On more practical level, the purpose is to have clear production, which is a strong side of REC as we have a list of companies which have implemented and went through resource efficiency and cleaner production audits. More than 90 audits have been implemented, and we also worked on the creation of agricultural, chemical, and construction products using cleaner methodologies, technological change, improved environmental and health conditions. Based on our experience we produced many publications, among others a guide for producers called "RECP Primer" which serves as a guide for those interested in green economic tool and practical approaches ensuring resource efficiency, economic savings and reduced waste. We also created Green Clubs in the regions and the members of these clubs had participated in trainings on various environmental topics. The last component was the assistance in the development of action, which would enable to integrate efficient resource management in the production. Based on our recommendation, new innovative products and approached were developed from the side-products and waste, which resulted in the revenue upscaling of the given company. We have an upcoming regional project of UNDP GEF covering the mapping of forest areas and the establishment of information database on forest cover in all three countries. Key partners of this project are the World Resource Institute, Ministry of Environment, Forest Committee, and "Hayantar" SNCO. Two stakeholder discussions regarding this project have already taken place in each of the countries, we have included suggestions and recommendations of our stakeholders, and will follow-up on them during the project implementation.

HAYBUIS FESTIVAL

Since 2015 the HayBuis Festival has annually celebrated the unique Armenian herbs and the traditional knowledge used to harvest and prepare them. The festival is held in the picturesque Tavush region. In June 2019, visitors learnt about Armenian herbs, the diverse methods of using them, and their medicinal properties. Perhaps the most exceptional part of this year's HayBuis was the record-breaking 20-meter long lavash "brtuch" (means wrap in Armenian).

PHOTO : EMILIA PAYTYAN, ANGIN ARAKELYAN, GIZ

HISTORY

In 2015, the co-founder of the Apaga resort, Irina Chibukhchyan, the artist-designer and director-animator Anna Qolozyan, and the author of family creative projects ("Seeds of pomegranate," "Ayb Ben Gim," etc.), the educational psychologist Gayane Aghayan implemented the first herb festival in Armenia. HayBuis is a multifaceted festival with various master classes and lectures on the fields where plants are used: architecture, handicraft, light industry, medicine, education, music, art, etc. The aim of the HayBuis Festival is to promote the rational use of plants as one of the valuable resources of the country. The festival aims to teach to effectively use the plants in everyday life and to maintain healthy lifestyle, to develop environmental thinking, as well as ability and desire to actively conserve the nature of the motherland. The concept of the festival can be expressed by the slogan: "We care for what we love. We love what we know!"

HAYBUIS 2019

In 2017 and in 2019, GIZ supported the HayBuis Festival in the framework of IBiS programme. In June 2019, around 2000 guests at the festival took part in a wide range of informative and entertaining events such as exciting master-classes using herbs, the Armenian herbal tea ceremony, educational games, and other activities for children. During the festival, IBiS introduced the new initiative: the "Green Bus Tour" that is part of its public awareness-raising campaign. Before embarking on its environmental education tour in different regions of Armenia, the "Green Bus" marked its first stop in Tavush and delivered environmental lessons for HayBuis participants. Among the many prizes awarded at the festival were the books "From Meadow's to Kitchen – Grandma's Secrets!" and the "Armenian Vine and Wine" [1] published by GIZ that highlight the rich biodiversity and endemism of Armenia.

THE BIG "BRTUCH"

The organizers of this beautiful event explained that the preparation of the "brtuch" symbolizes the idea of the connection of the family (bread), life (Armenian herbs) and peace (the types of cheese rolled in the "brtuch" are either produced in different regions of Armenia or imported to represent various nations of the world) in Armenia. The embassies of foreign countries represented in Armenia participated in the making of the international "brtuch" by using the types of cheese produced in their own countries. ◆

[1] The books "From Meadow's to Kitchen – Grandma's Secrets!" and the "Armenian Vine and Wine" can be purchased at the bookstores in Yerevan and in Amazon.

WILDLIFE PROTECTION POSTERS IN SOVIET ARMENIA

Posters were one of the tools of the Soviet propaganda. This format was also used when it came to the wildlife protection, which was endangered, especially as a result of the fast industrialization of Soviet republics.

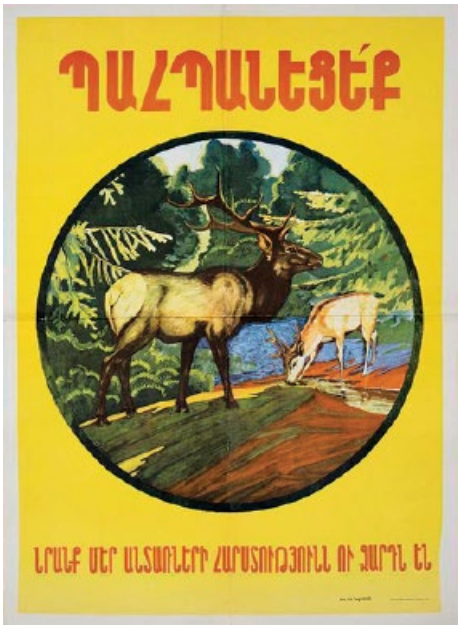
POSTERS : FROM THE COLLECTION OF NATIONAL LIBRARY OF ARMENIA

Please, help! The protection of nature is a nationwide effort

Help to preserve these animals

Leopard is a rare animal, protect it

Do not shoot: Conserving nature is a nationwide effort



Conserve wildlife, they are the wealth and adornment of our forests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