

Final Project Evaluation Report

Your Details	
Full Name	Nelli Barseghyan
Project Title	Testing of experimental methods for restoration of natural population of endemic fish species of Lake Sevan – Sevan trout
Application ID	25682-2
Grant Amount	4794.41
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Date of this Report	17.06.2019

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
To reveal the most effective methods for incubation of Sevan trout eggs in natural conditions and restoration of wild population				Some planned experiments were not realised. Particularly, experiments concerned with the use of just fertilised eggs of summer trout failed for different reasons. The experiment with milking and fertilising of eggs with further installation of boxes for incubation of just fertilised eggs in the rivers failed because no mature individuals of Sevan trout were caught in the rivers to complete the experiment during the six field campaigns. This was due to unusually dry and warm winter of 2017-2018 and as a result fast warming of river water. So, probably if yet occur, the spawning of summer trout finished before July 2018. The other experiment which has been partially completed is the incubation of eyed eggs of summer trout in the artificial nest. Buried nest in Masrik River was covered by fine sediments carried by the water within 2 weeks after installation which lead to the complete mortality of eggs. Such velocity and as a consequence the volume of fine particles in the period of installation of just fertilised eggs are not so common, that's why we can't state that this method has absolutely no potential for restoration of Sevan trout wild population in river Masrik. All other experiments were completed successfully.
To reveal the features of Sevan trout egg development stages dependent on different natural conditions of the rivers				As all other planned activities involving monitoring after installation of WVB boxes were carried out successfully, the differences and the factors leading these differences for a range of hydro-chemical, hydro-

			physical and hydrological conditions were revealed. Specific mortality of eggs during the different stages of maturity for different experiments were revealed as well.
The efficiency of incubation dependent on the differences in bio-conditions and methods for chosen parts of the rivers Masrik and Lichq will be revealed			Periodic observations of hydro-physical, hydro-chemical and hydro-biological parameters of chosen parts of the rivers has allowed to compare the results of egg mortality in different periods of experiments and bio-conditions of the habitats. The only problem was observed with unusual high volume of fine particulate in mother bed of the river Masrik as a result of what the experiment with incubation of eyed eggs of summer trout was failed. Thus, the efficiency of incubation by other methods was fully observed and described for each of the sites and each of the installed boxes.
To develop the most efficient methodology for artificial breeding and further growth of alevins in natural conditions			As some experiences failed due to different reasons, we can't definitely state that the method which has shown the best final outcome in the meaning of survivor of eggs is the most effective one. However, the effectiveness of the method proposed was proven.
Homing towards the rivers of origin by incubation of Sevan trout eggs in natural conditions will be reached			To state that we have reach this objective further monitoring of the fish released from boxes after the incubation is necessary up to their maturity. Because currently we initiated this monitoring, the success of this objective would be seen only during the 3-year period. At the same time the unforeseen issue was observed at river Lichq: in the yolk-sac larval stage of development the Gammaridae crustaceans were regularly attacked the boxes and probably fed on dead yolk-sac larvae or evasive individuals. So, we now have concerns about the faith of larvae after absorption of yolk-sac and release from the boxes.

<p>public awareness to the problem of Sevan trout conservation and restoration of its natural population will be raised through publications and dissemination activities</p>				<p>All activities regarding to this point were initiated or currently ongoing. The leaflets were printed and disseminated during the meeting and discussions with local authorities, the video has been created and disseminated through social media, scientific results were represented to the academic bodies and scientific paper with the main results is now under the writing process.</p>
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

As we have planned to start from October of 2018 by testing different methods of artificial incubation of just fertilized or eyed eggs of gegarkuni trout and then continue the work from May for summer trout, but received the contract from Rufford Foundation earlier (in June), we rescheduled all the works to be on time and report the results. So, as a result of such changes we have some troubles with the experiments concerned with summer trout as we have probably lost the precise period of spawning of wild population and no mature individual were caught during the planned field trips. The unusual dry and warm winter of 2017-2018 has also played significant role in the missing of the right period of spawning migration, because as the water temperature measurements showed, during the beginning of the works water temperature even reach +19°C during the day.

One more unforeseen difficulty regarding to experiments was the unusual high flow of fine sediments in the Masrik River which probably the result of exploitation of Sotq mine at the upper course part of the river. Due to such conditions and as a result the failing in one of the experiments with artificial incubation of summer trout eggs, the place for experiments on gegarkuni was changed and one the tributaries of Masrik River not impacted by the sediments was chosen.

One more specific unforeseen issue was concerned with the revelation of regular attacks of Gammaridae crustaceans on incubator boxes in Lichq River. As we have no evidence of feeding of this crustacean by larvae of Sevan trout after absorption of yolk sac but we need to carry out special experiments and observations regarding this issue.

3. Briefly describe the three most important outcomes of your project.

First of all, it was shown that artificial incubation of eggs of Sevan trout in the rivers Lichq and Masrik is possible and compared with the methods used up to now for restoration of wild stocks is very effective as the average numbers for success rate in the Lichq River for summer ischkhan were around 80% and for gegarkuni were around 85%. For the Masrik River the figures are quite worse 0% for summer ischkhan (the reasons are described above), and 81% for gegarkuni.

The second important outcome is that the artificial incubation of eyed egg is significantly more effective than the incubation of just fertilised eggs in the range of bio-conditions of the rivers. Parallel to that, the rivers with stable bio-conditions are better suited for such technique of restoration of wild population of Sevan trout than the rivers where seasonal changes in hydro-physical and hydro-chemical conditions are well expressed.

The involvement of local communities and knowledge transfer during the monitoring activities could have multiplier effect in the future as local stakeholders could now use the method by themselves to achieve also financial benefits.

4. Briefly describe the involvement of local communities and how they have benefited from the project.

All experiments were carried out in the territories of local communities and partially in the areas involved in private properties of local dwellers. So, initially the negotiations and involvement of local communities on behalf of administrations and local stakeholders were ensured during the first field campaign. Local stakeholders were actively involved in the process of monitoring and benefited by the knowledge transfer about the experiments and their features. Thus, now these experiments can be continued also by locals and can bring them financial assets as well.

After completion of the experiments and processing of the data, the results were represented to local authorities and the representatives of governmental bodies were also participated in the discussions. As the gaps and main issues were broadly represented, the consciousness and awareness of local population towards different factors and activities affecting wild population of Sevan trout arose.

5. Are there any plans to continue this work?

As the success of proposed methods for Sevan trout wild stock restoration depends not only from the percentage of survivor of eggs, but also from the homing reflex of fish, the nearby plans are fully concerned with the studies on return of fries in mature stage of life for spawning as well as recognition of risks coming from Gammaridae crustaceans toward sac fries. As we have doubts that Gammarids can harm the fries right after sac stage of development, the study of the effects could made serious corrections in proposed techniques of artificial incubation. Thus, we are going to apply to the local funds for continuation of the studies.

6. How do you plan to share the results of your work with others?

The process has already initiated and still in active phase. First of all, we organised a mini workshop with local authorities and stakeholders to share the results and discuss the concerns and main perspectives of proposed methods. The representatives of governmental bodies were also present and participated in discussions with their proposals. Along with the workshop the leaflets with the main ideas and results of the project were shared among the representatives of communities and local administrations.

Also, we are regularly in touch with our partners from the “Foundation for restoration of Sevan trout stocks and development of aquaculture” and sharing with them any results concerned with the success rates and unforeseen issues revealed during the project implementation. Because the actions are well documented by us, we have also prepared a short video of the process, which was shared through social media to reach larger audience.

The scientific results were represented and discussed in the Scientific Center of Zoology and Hydroecology of National Academy of Sciences of Armenia with participation of representatives of some environmental NGO's.

Currently we are working on scientific paper regarding the results of different experiments to reach the broader scientific audience too.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

Grant was used for the period of 12.06.2018-12.06.2019. And even the length of the grant 1 year as it been approached, but some changes in the schedule of works were however made. In the proposal we have planned to start the activities from autumn of 2018 which is coinciding with the beginning of spawning season of gegarkuni. But, as the results were announced quite earlier than we expected and the contract were signed at 12.06.2018 by us, thus we have changed the schedule to be on time with the results and reports. As a result of such changes we have started the project from experiments concerned with the summer trout initially planned for the May-August of 2019.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

The main technical problem we have met during the project implementation is the serious drop in exchange rate of £ sterling related to Armenian Dram which is the only acceptable currency in Armenia. So, all the calculations and planning during proposal acceptance was done by the rate 660 AMD/£ sterling but at the day we have received the money and changed to AMD the rate was 623AMD/£ sterling (www.rate.am). Thus, we have made some corrections in the budget and avoid or limit some expenses by using the existing in the Institute of Hydroecology and Ichthyology of SCZHE NAS RA equipment or applying to our partners. So, totally we have over budgeted 44 £ sterling.

Item	Budgeted Amount	Actual Amount	Difference	Comments
20 field trips to South of Lake Sevan for the monitoring of egg planting and bioconditions	2273	2389	+116	£ sterling/AMD ratio changes
Aqua-Vu AV715c Underwater Camera	222	342	+120	As the model was no longer produced, Aqua-Vu micro revolution Pro5.0 was bought instead
6 field trips to South of Lake Sevan for fish catch, and WVB installation	1045	1098	+53	£ sterling/AMD ratio changes
Leaflet printing	425	447	+22	£ sterling/AMD ratio changes
Catering services	300	220	-80	Some cheaper menu was applied
Solar Charger 24000mAh Power Bank (1)	30		-30	provided by IHEI SCZHE
Stationery (papers, markers, diaries etc.)	30		-30	provided by IHEI SCZHE
Laboratory supply (Ethanol, gauze, containers etc.)	30		-30	provided by IHEI SCZHE
Metal net to cover Whitlock-Vibert Boxes	23	23		0.5 meter less of planed length was bought
Whitlock-Vibert Boxes	230	240	+10	£ sterling/AMD ratio changes
Tarpaulin	107		-107	provided by Foundation for restoration of Sevan trout stocks and development of aquaculture
Eyed egg of Summer trout	45	45		additional amount provided by Foundation for restoration of Sevan trout stocks and development of aquaculture
Eyed egg of Gegarquni trout	45	45		additional amount provided by Foundation for restoration of Sevan trout stocks and development of aquaculture
TOTAL	4805	4849	+44	

9. Looking ahead, what do you feel are the important next steps?

As Sevan trout is critically endangered species and the restoration of wild population depends on artificial interventions, we think that large scale use of the method of egg planting directly in the rivers of Lake Sevan basin can significantly contribute in achievement of positive results. At the same time the works need to be organised at two ways: 1. the process of assessment of rivers potential to support the reproduction of Sevan trout need to be continued; 2. Deeper studies of risks for sac fries as well as the success of return to the rivers of origin for spawning need to be carried out.

Along with these studies other opportunities for rapid restoration of wild population need to be checked and the results compared with proposed and traditionally used methods.

But at this moment the most important step from our point of view is to enlarge the scale of experiments with artificial incubation of Sevan trout' eyed eggs in different rivers of Lake Sevan basin combined with the rising of awareness of local communities and stakeholders towards the importance of different measures for conservation of this endangered fish species.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

The Rufford Foundation logo was used in all the materials printed or presentations prepared in the frame of the project. Also, the name of foundation will be putted into the acknowledgement section of the paper which now under the preparation.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Tigran Vardanyan (PhD in Biology) - senior scientific researcher at the Institute of Hydroecology and Ichthyology of SCZHE NAS RA. During the project he mainly contributes in egg planting activities.

Vardan Asatryan (PhD in Biology, MSc in geography) - senior scientific researcher at the Institute of Hydroecology and Ichthyology of SCZHE NAS RA. He is a specialist in hydroecology and geoecology. His main contribution was in implementation of monitoring activities

Marine Dallakyan (PhD in Biology) - senior scientific researcher at the Institute of Hydroecology and Ichthyology of SCZHE NAS RA. She was contributed mainly in assessment of water quality by bioindication methods.

12. Any other comments?

Due to financial contribution of The Rufford Foundation, other organisations like Scientific Center of Zoology and Hydroecology, Foundation for restoration of Sevan trout stocks and development of aquaculture and individuals were also

consolidated during the project and highly contributed by their physical and technical support. Thus, we would like to express our sincere attitude towards everyone who support us and to the all members of The Rufford Foundation.

