

Project ID: 02140813

# Conservation of the Critically Endangered Bolivian Frog *Psychrophrynella illimani*

Total, Bolivia

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FINAL REPORT

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## Project Partners & Collaborators

Analysis of chytrid samples was done in collaboration with Prof. An Martel and Prof. Frank Pasmans, Department of Pathology, Bacteriology and Avian Diseases, Faculty of Veterinary Medicine, Ghent University, Salisburyaan 133, B-9820 Merelbeke, Belgium

Steffen Reichle, biologist and conservationist, advised research and gave workshops during the conservation course.

The ‘Museo de Historia Natural Alcide d’Orbigny/Fundación para las Ciencias’, Cochabamba, Bolivia, provided logistic support.

The Bolivian Amphibian Initiative provided financial, logistic support and support with staff of this initiative that supported the project also as counterparty in some of the activities and expenses.

We are currently also hoping to do some analysis of mercury in water and soil samples in collaboration with the Ecotoxicology lab, Department of Biology of Antwerp University (Belgium) in order to quantify the environmental pollution caused by mining activities.

# Section 1

## Summary

During this project we have rediscovered the critically endangered frog *Psychrophrynella illimani*, not seen since its initial discovery in 2002. We furthermore show that the species occurs in a wider area and is relatively abundant. We obtained information on its morphology and natural history. The species showed to persist in a by human altered landscape and chytrid fungus is currently not present in the area.

Before this project people from local communities were unaware of the presence of this endemic species. After organizing workshops, focussing mainly on schools, many are now better informed, but their interest in this species and protection of their environment remains low. Plenty of gold mines are located in the region, where nearly all locals work. During the mining process, the toxic mercury is used but we have not yet an idea what the impact on *P. illimani* and the local environment is.

We have organized an amphibian conservation course for young biologists from several countries and organized several workshops in schools of the local communities. We also broadcasted publicity spots on the local radio, made calendars and painted walls with frog art to increase public awareness.

## Introduction

Amphibians are the most threatened group of vertebrates, with about one third of all species facing serious threats. Every year many new species are discovered, but all too often, further research to other aspects of the species' biology remains to be done. Project focussing on poorly studied amphibian species are therefore useful and can provide valuable information for conservation initiatives.

The critically endangered frog *Psychrophrynella illimani* was known from only one locality and had not been observed again since its initial discovery back in 2002 (De La Riva, 2007). Information such as distribution, ecology and natural history was lacking. By combining field research, education and capacity building, we hoped to safeguard this frog and to increase public awareness.

Increasing our scientific knowledge about the species, identifying current and potential threats are of major importance for effective conservation. In the meantime we can interact with local stakeholders and communities to increase awareness, conserve and improve habitat quality. Local biology students and volunteers are involved during this work to promote future conservation initiatives.

The study area is heavily degraded by both livestock and mining activities. A map of the study area is provided in figure 1. In the following sections we present the results of our project, which included both field trips for the collection of data and the organization of workshops and courses to increase public awareness.

## Project members

The following project members initiated the project and spend a lot of time and effort to make it happen:

Arturo Muñoz

- Current occupation: Coordinator Bolivian amphibian initiative, Researcher Ghent University
- Project roles: team leader, practical organization, scientific research, report writing
- Qualifications: Master in Biology, good organization skills, enthusiast course lecturer

Bert Willaert

- Current occupation: environmental consultant for the government of Ghent, Belgium
- Project role: scientific research, practical organization, report writing
- Qualifications: Master in Biology, experienced photographer, good organization skills

Andrea Fuentes

- Current occupation: administrator of safety and environment for Trans Uno SRL
- Project roles: practical organization, education, scientific research
- Qualifications: Master in Environmental Engineering, experienced in organization of workshops

Consuelo Morales

- Current occupation: consultant at Amandes SRL, Bolivia
- Project role: practical organization, education
- Qualifications: Master in Biology, good organization skills

The following people volunteered in the project and made as such valuable contributions:

- Sophia Barron Lavayen (Bolivia)
- Natalia Sanchez de Lozada Bianco (Bolivia)
- Gabriela Agostini (Argentina)
- Norman Alastor Greenhawk (Puerto Rico)
- Felipe Mamani (Community member, Totoral, Bolivia)
- Ineke Plaetinck (Belgium)
- Gabriel Callapa (Bolivia)

## Section 2

### Aim and objectives

We want to contribute to a complete understanding of anuran ecology and behavior. Local people should be able to tackle current and future conservation challenges themselves through a solid knowledge on natural history and a sense of responsibility for the environment they live in.

Our aim was thus to establish a community-based conservation project, helping to adjust local people's lifestyle to the needs of threatened species (in our case the anuran species *Psychrophrynella illimani*) by using educational and scientific methods.

This aim was translated into the following four objectives:

1. Improve scientific knowledge on the critically endangered frog *Psychrophrynella illimani*
2. Assess the conservation needs for *P. illimani*
3. Direct conservation
4. Capacity building

### Changes to original project plan

Our initial plan was highly ambitious and it is therefore not surprising that not all steps of our four main objectives have entirely been fulfilled. Some studies that we wished to carry out have not or only partially been implemented in the project due to time constraints. Examples are a population size estimate, the modeling of a climatic envelope and studying the impact of mining activities. These are all aspects that require a robust dataset and we are therefore confident that the first steps towards achieving results for these research and conservation issues have been put during this project.

We spent also much time on our third objective, direct conservation, but we believe this will only prove to be successful on the long term, with a continued effort of education. We did not organize a final exhibition with the results in La Paz as planned in the activities of the project application. This seemed to bring little benefits to the project, as our study site, despite being relatively close to La Paz in airline distance, had no real connection to this capital.

### Methodology

#### 1. increasing scientific knowledge

A major part of our work consisted of fieldwork, during which we visited a wide area surrounding the type locality of *Psychrophrynella illimani*, both during day and night. During these field trips, we collected animals that were later deposited in the 'Museo de Historia Natural d' Alcide Orbigny' in Cochabamba, recorded the advertisement call, collected information on temperature, humidity and clutch size. For more information, we refer to our research paper (Willaert *et al.* 2016) in which we provide an overview of all methods used.

#### 2. Assess the conservation needs for *P. illimani*

Chytrid swabs were taken from 63 individuals and analyzed in the lab. Data loggers capturing temperature and relative humidity data were used to obtain microhabitat properties that might be linked to climate change. By interacting with local communities, we tried to understand

how well people were aware of the presence of this endemic species and how much willingness there is to conserve it.

### 3. Direct conservation

Awareness on the presence of this endemic species seemed to be non-existing among the local communities, so presentations and workshops were given during community meetings and at schools, in which we mainly focused on awareness of children. As further steps, e.g. establishment of non-grazing zones and restricting the use of mercury during the process of gold extraction... will require a positive attitude towards these frogs and active involvement of the locals, increasing awareness showed to be the most urgent aspect.

### 4. Capacity building

We organized a 5-day training course about amphibian biology and conservation, with a focus on amphibians of the high Andes. The target audience was young biology students (and related studies) from Bolivia (50 %) and other South American countries (50%). An overview of all workshops offered during the course is given in attachment (time sheet course).

Several volunteers (both Bolivian and other nationalities) were later involved in the fieldwork of the project and in this way they had a practical training during of different aspects of amphibian research during the fieldwork.

## **Outputs and results**

### **Improvement of scientific knowledge of *P. illimani***

We improved the knowledge of this poorly known species, with the discovery of several new localities, between the villages Tres Rios, Cooperativa 15 de Agosto, Chuñawi and Lambate (between 3321 and 4044 m asl). We now estimate the species is distributed in an area of at least of 150.2 km<sup>2</sup>, while previously it was only known from a single valley (figure 1). The frog was locally abundant, with an average of seven individuals per 100 m<sup>2</sup>.

We also obtained information about the reproduction of the species, with a terrestrial egg clutch and direct development, like seen in congeneric species. The males take guard the egg clutches. We recorded and described the advertisement call for first time (Figure 2). Other species encountered in the same area were *Pleurodema marmoratum*, *Gastrotheca marsupiata* and *Pristimantis platydactylus*. During our last field trip, we also collected a couple of specimens with a distinct call. These probably belong to another *Psychrophrynella* species, likely new to science. Further research will be conducted to record the call and to describe this new species.

### **Assess the conservation needs for *P. illimani***

To test for the presence of *Batrachochytrium dendrobatidis* (*Bd*), a total of 63 individuals were swabbed on nine different locations (figure 1B, figure 3G). Additionally *G. marsupiata*, *P. marmoratum* and *P. platydactylus* were swabbed during the surveys. All swabs tested negative for the presence of *Bd*.

We deposited four data loggers for a period of over one and half year to measure temperature and relative humidity in the study area. Two data loggers were installed below stones near an egg clutch of the frogs (nest) and the two others in the nearby environment (figure 3D). The average nest temperature in 15 de Agosto was 10.0 ± 3.1°C and the relative humidity 99.6 ± 1.7%. Environmental temperature was similar, but relative humidity was much more variable. In Chuñawi the average nest temperature was 12.1 ± 4.2°C and the relative humidity 99.9 ± 0.3%. Environmental temperature was more extreme. This information is valuable to understand the possible effects of climate change on the species. During our fieldwork we

also tried to record all human activities in the area that are possible threats and could affect the survival of this species. Threats include habitat destruction by fire and mining, pollution by the use of mercury and habitat degradation by grazing livestock (figure 4 from A to D).

### **Direct conservation**

During our presence in the field, we shared our findings and amphibian facts with local people (figure 3C). We provided different workshops for schools in the five nearby villages and to local community members, to improve public awareness. This also included a one week workshop specifically for teachers working in schools within the study area (Figure 4E & 4F).

As part of the dissemination of information about this endemic frog species, we designed and distributed 150 T-shirts and 1000 calendars for 2014 about the frog with a short message (figures 6 & 7). We also broadcasted two radio spots about the frog that were published in local and regional radio stations (see appendix 1). As a final activity in the area, we designed wall paintings about the local fauna with the frog as a central character (figures 8 and 9). All of these activities had the goal to increase awareness. We also had workshops and meetings about the frog and our project with different local community members, authorities and local stakeholders. We regularly updated our project websites with new media (see ‘address list and web links’)

People now seem to be better informed than before our project took place. It seems that before the initiation of the project, no one realized that such an endemic frog occurred in their backyard. The bond between the project and the local communities must be further strengthened if we would like to take some conservation measurements in future (e.g. establishment of a non-grazing zone). As the interest in the frog itself is limited, further improvement of public awareness about the importance of the environment seems appropriate.

### **Capacity building**

With the goal to provide more knowledge and skills to our team and to other members of the ‘Museo de Historia Natural Alcide d’Orbigny’, we organized a three days theoretical workshop for 23 Biology students in Cochabamba about conservation subjects with the tools and skills provided by CLP. We also organized a 5-day training workshop (theoretical and practical) on amphibian conservation for 16 students from Bolivia, Peru, Argentina and Colombia (Figure 4G & 4H). Participating students were selected on their background and motivation and a mix of students of biology and environmental sciences was invited to the course that took place in Sorata.

During the field trips, several volunteers have joined us to assist in project work, some of them after participating in the workshop. Volunteers have gained good practical experience and as seen from the evaluation of the course, participants were happy to have learned much about amphibian conservation.

### **Communication and application of results**

The results obtained during the project have been spread by different means such as meetings and presentations with local authorities; meetings and a preliminary report to “Dirección general de Biodiversidad”. We also shared our findings with the local communities through educational activities, workshops, presentations and diffusion material. During the last field trip, a report and workshop were presented with the main findings. We also shared our results

in the ‘Bolivian amphibian need assessment’, carried out by Amphibian Ark and the Bolivian Amphibian Initiative in June 2014.

The scientific information obtained during the field trips have been bundled in a scientific paper that has been accepted in the peer-reviewed journal *Salamandra* and that will be published in 2016 (Willaert *et al.* 2016). Thanks to this dissemination of our results, especially the last two, now, there is an international project that probably is going to work with the species, because now after our project, *P. illimani* is one of the best known species of the genus.

News and results are also shared on the project website and facebook page. Other websites, like the Bolivian Amphibian Initiative website have also been used. Finally, we also created radio spots that have been disseminated in the towns of the area and for a limited period also on a national radio station.

### **Monitoring and evaluation**

For the evaluation of the achieved increase in scientific knowledge, we compared the information at the beginning of the project with the situation now. We can conclude that all information obtained during the field trips has caused a huge increase in this knowledge.

For the assessment of the conservation needs for *P. illimani*, we provide information about the threats to this species in different areas, hereby providing a shapefile with the mines, the surface covered by human activities and the main villages and roads in the area.

For the direct conservation we carried out pre and post-tests in the different schools where we provided workshops and educational activities. We observed a clear improvement of knowledge about the biodiversity and the frog in the area at a short time scale. We would like to evaluate this impact also on a longer scale (e.g. a couple of years after the initiation of the project).

For the capacity building aspect, we asked participants to do a small project and present the results on the last day of the course. We also asked all participants to fill in a questionnaire (see attachment), to obtain feedback on the workshops, accommodation and meals. Results of this questionnaire were generally positive with some good suggestions for future activities.

### **Achievement and impacts**

In general, we can say that the project has been a great success: the critically endangered frog *Psychrophrynella illimani* that had not been reported since it was discovered in 2002 has been observed on several locations. We also obtained a lot of information about its natural history, information that was completely unknown before the onset of this project. The frog was also found to be relatively abundant and from all chytrid samples taken, not a single was positive.

Due to our presence in the area and our efforts to protect this species, people from the local communities now know about the presence of this endemic species, while before the project, none of the locals seemed to be aware of the presence of this endemic species. Furthermore, local people obtained a better understanding of amphibians in general after the variety of workshops and lectures we organized.

By organizing a conservation course about amphibians for young biologists from several South American countries, we motivated these youngsters to start their own projects and strengthened their knowledge on amphibian biology and conservation. Following this course, four of the participants continued working as volunteers in our project.

We believe that the rediscovery, range extension and increased knowledge about this critically endangered frog will have a positive impact on its conservation. Furthermore the involvement of young people and the increased awareness among local youth surely has a positive effect that hopefully will also show beneficial in future.

## **Capacity Development and Leadership capabilities**

The following can be stated about gained experience:

### For the entire team:

- working together with people with different backgrounds and as such learning to appreciate the different qualities associated with those people.
- working in communities where a complete lack of interest in conservation because of gold (much money involved)
- organization of a 5-day course and taking the responsibility for a group of national and foreign students following this course

### For Arturo:

- Motivating team members during long days with sometimes harsh weather conditions.
- Being patient with team members and to learn to be a good leader.
- proposal writing and reporting.
- Organizing and coordinating with national organizations and authorities for the development of one project.
- To organize the logistics of one conservation project in a remote area.

### For Bert:

- dealing with bureaucracy
- conducting field work in remote places during harsh weather conditions
- proposal writing and reporting
- supervising and motivating students and volunteers
- contradictions between economical and environmental interests

### For Andrea

- arranging logistics for workshops
- working with local communities (Aymara)
- develop social skills
- broader perspective of how local communities think about conservation.
- Experience and knowledge about the work in conservation.
- New ideas of how conservation projects should tackle their activities in a longer time scale.

### For Consuelo

- Experience to work in a team

- To see the extreme conditions where local communities live and where one wants to carry out conservation work.
- To see the real situation of local communities regarding conservation, where they just don't have knowledge about the effects of human activities or where they just do not have other option, in this way conservation projects should think about this situations once they want to carry out conservation in one area.
- Learned to work with local communities, including children with a poor background
- Learned to organize logistics, with the practical organization of a course for which she was in charge.

## Section 3

### Conclusion

The endemic frog *P. illimani* has been rediscovered and several field trips have shown it to be locally abundant and persistent in a by human altered landscape. Many aspects of our objectives have successfully been carried out.

Data on range, climate, call, and reproduction have been obtained and published. The most important threats have been identified and are habitat destruction caused by agriculture and mining, while *Bd* was not found in the study area. The use of mercury and the pollution of the environment is an aspect that remains to be studied.

Before this project people from local communities were unaware of the presence of this endemic species. After organizing workshops with a focus on local youth many are now much better informed. It seems however that a long-term interest in this species and protection of their environment will require further action. The main reason for this are the huge economical benefits people obtain on the short-term with mining activities, versus the impact on the environment, that is harder to assess on the same timescale.

With the organization of the conservation course for young people with a strong interest in biology and environmental issues, we hope to have motivated at least some of the participants to initiation conservation initiatives themselves.

A few problems encountered are the difficulties with working on a volunteer basis, environmental versus economical interests and the sometimes difficult communication with different cultures. These problems are all discussed more in detail in the section below.

### Problems encountered and lessons learned

In general we believe the project was a great success, with much valuable information as a result. However, there were some issues encountered that need some reflection:

The work volunteers can do is limited in time, as everyone needs an income. We noticed that project members had difficulties to fit the voluntary work in their working schedule. To obtain a sustainable project in the long term, more funds will be needed. Ideally an income is created through the project (e.g. tourism), so that a part-time job can be offered to a local person to monitor populations and organize activities further improving awareness. This is however far from easy, as it is hard to motivate people, earning easily a relatively high income by working in gold mines, to (partly) give this up to concentrate on other activities (e.g. tourism). Furthermore, the location is hard to reach and public transportation is limited. Amphibians are generally not considered cute or beautiful and do as such not receive the same attention from tourists as for example birds or mammals. The region however offers some very interesting options for long distance hikes and bird watching, something that could be studied in future.

Making people change their opinion on nature and conservation is hard. The social organization of local communities in the region is complex, with 'dirigentes' having a lot to say about activities and organization. Many 'dirigentes' have however left the village and

often live in larger cities, only to return to the village during weekends or for special occasions. As they usually have an important voice in decision making, this resulted in difficulties when arriving in places where the ‘dirigente’ was out of town. We therefore had to arrange meetings in advance and make clear agreements with the ‘dirigentes’ about the workshops we wanted to organize in local schools, as without the permission of the ‘dirigente’ during activities, local people might be unwilling to collaborate with activities.

## **In the future**

### This project

We plan to develop a final report in Spanish, so local communities and Bolivian authorities can more easily access information. We also plan to carry out an evaluation (after 1 year) to see what impact we had with the educational activities in the area (post-test for children in schools)

With the support of the Bolivian amphibian initiative we would like to start small research/monitoring projects (e.g. thesis of biology students). This would allow us to gather more and up to date information about this species. As we are quite sure that during the last trip we also have found a new *Psychrophrynella* species, we would like to conduct further field research in order to describe it and to gather information on its ecology and natural history. This, combined with genetics, then allows us to better understand the distribution and speciation patterns of this genus in the Andes.

We realized during this project that more effort to increase awareness is needed and that this might be hard, due to the economical importance mining activities have in the area. One interesting aspect is the use of mercury during the mining process, because this does not only affect the environment, but also people’s health. There is currently no information about the abundance and impact of this metal in the region, but we already sent some samples to a laboratory for analysis.

### Further

We would like to conduct similar research to other badly known *Psychrophrynella* species (updated information is required, as we have seen in the status of *P. illimani*). Thanks to the information provided by this project, there now is an interest of international researchers to carry out more research to the thermal adaptation of these species to the environmental conditions they live in.

## **Financial report**

In the attached file “Financial report Illimani” we present the expenses during the project and also some justifications to some expenses less than the expected and in some cases more than we budgeted but in general we kept the total amounts within the budget. Please see details in the attached file.

## Section 4

### Bibliography

De La Riva I (2007) Bolivian frogs of the genus *Phrynopus*, with the description of twelve new species (Anura: Brachycephalidae) **Herpetological Monographs** 21: 241-277

Hijmans, R. J., S. E. Cameron, J. L. Parra, P. G. Jones & A. Jarvis (2005) Very high resolution interpolated climate surfaces for global land areas. – **International Journal of Climatology**, 25: 1965–1978.

IUCN (2001): IUCN red list categories and criteria Version 3.1. - IUCN Species Survival Commission (Ed). Gland, Switzerland and Cambridge, UK, 1–32 pp.

Quantum GIS Development Team (2014): Quantum GIS Geographic Information System.

Willaert B., Reichle S., Stegen G., Martel A., Lavayen S.B., de Lozada Bianco N.S., Greenhawk N.A., Agostini G., Muñoz A. (2016) Distribution, ecology and conservation of the critically endangered *Psychrophrynella illimani* (Anura, Craugastoridae) with the description of its call. **Salamandra**

### Address list and web links

[www.jampatu.org](http://www.jampatu.org)

Website built around the project. We hope to keep this website alive to continue with the conservation of *P. illimani*, but also to start new similar project with other *Psychrophrynella* species.

[www.facebook.com/jampatu](https://www.facebook.com/jampatu)

Facebook page of the project.

[www.bolivianamphibianinitiative.org](http://www.bolivianamphibianinitiative.org)

Website of our partner organization

<http://bolivianamphibianinitiative.org/psychrophrynella-illimani-project/>

information about the project and some resources produced by the project accessible to the conservationists a general public.

<http://museodorbigny.org.bo/home.htm>

Museo de Historia Natural Alcide d'Orbigny

### Distribution list

The reports of the project and some information and samples can be found in the Museo de Historia Natural Alcide d'Orbigny, Cochabamba, Bolivia

The reports were distributed in the following institutions and the final version of the report in Spanish will be distributed in:

- Local communities of Lambate, Chuñavi, Totoral, Ikiko and Tres Rios
- Dirección general de Biodiversidad, Ministerio de Medio Ambiente y Aguas, La Paz Bolivia

- Our project website [www.jampatu.org](http://www.jampatu.org)
- Bolivian amphibian initiative website [www.bolivianamphibianinitiative.org](http://www.bolivianamphibianinitiative.org)
- Fundación para las ciencias <http://www.fundacionciencias.org/>

## Appendices

Appendix 1: links to audio files and movies:

- Movie of the call of *Psychrophrynella illimani*:  
<http://vimeo.com/100809980>
- Movie of activities in 2013 of the Bolivian Amphibian Initiative, including this project:  
<https://www.youtube.com/watch?v=Y7-yTpSXCJU>
- audiofile of radiospot broadcasted in order to increase awareness (scroll down on page):  
<http://bolivianamphibianinitiative.org/psychrophrynella-illimani-project/>

Appendix 2: CLP M&amp;E measures table

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project		
Number of species assessments contributed to (E.g. IUCN assessments)	1	We will provide the new information to the IUCN for the new assessment of the species
Number of site assessments contributed to (E.g. IBA assessments)		
Number of NGOs established		
Amount of extra funding leveraged (\$)		
Number of species discovered/rediscovered	2	1 species rediscovered. 1 possible new species
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	0	
Number of species/sites legally protected for biodiversity	0	
Number of stakeholders actively engaged in species/site conservation management	0	
Number of species/site management plans/strategies developed	0	
Number of stakeholders reached	6 communities	Local communities in and surrounding the study area
Examples of stakeholder behavior change brought about by the project.		Too early to say
Examples of policy change brought about by the project	1	The adequate evaluation of the species with the provided data in the amphibian need assessment for Bolivia organized by Amphibian Ark and Bolivian amphibian initiative
Number of jobs created	0	
Number of academic papers published	1	Accepted in Salamandra
Number of conferences where project results have been presented	2	Part of the results in the Congreso de Ecología in Santa Cruz de la Sierra, Bolivia, June 2014 Part of the results in the ZACC conference, in October 2015 Denver zoo. But is part of future work

Appendix 3: figures

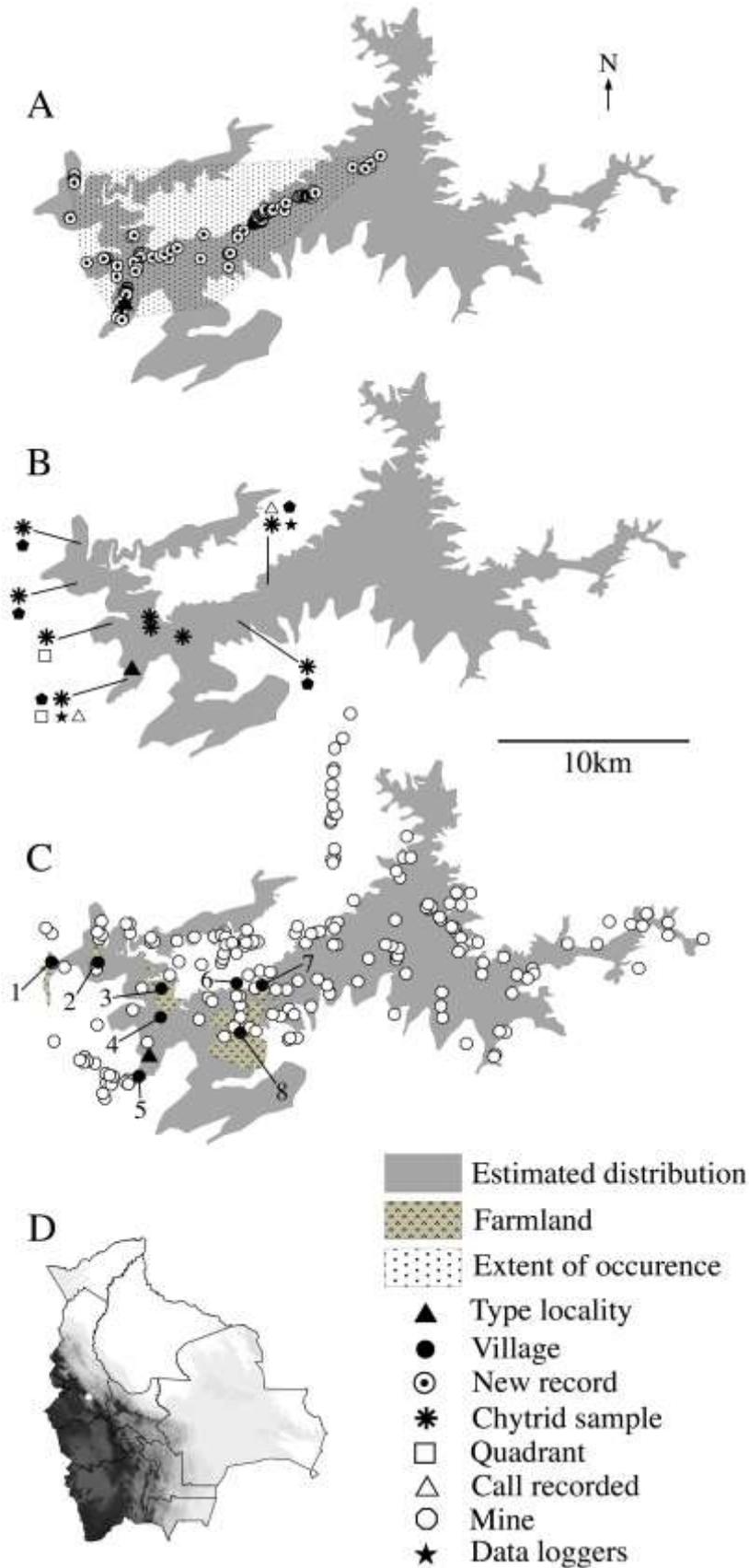


Figure 1: (A–C) Maps with estimated distribution, extent of occurrence as defined by the IUCN (IUCN 2001) of *Psychrophrynella illimani* and other parameters (see legend in figure).

(D) Map of Bolivia with white areas corresponding to an elevation of 0–1000 m, light gray 1000–3500 m and dark gray >3500 m [data available from WorldClim version 1 (HUMANS et al. 2005) and edited in QGIS 2.4.0 (Quantum GIS Development Team 2014)]. Location of maps A–C is shown on D with a white circle. Numbers in map C correspond to the following villages: (1) Tres Ríos, (2) Cañohuma, (3) Iquico, (4) Totoral, (5) Cooperativa 15 de Agosto, (6) Santa Rosa, (7) Chuñawi and (8) Lambate. Figure from Willaert *et al.* (2016).

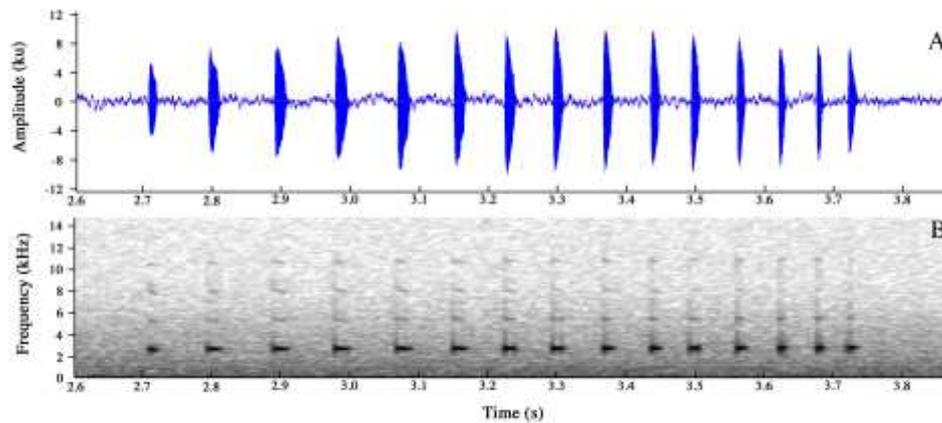
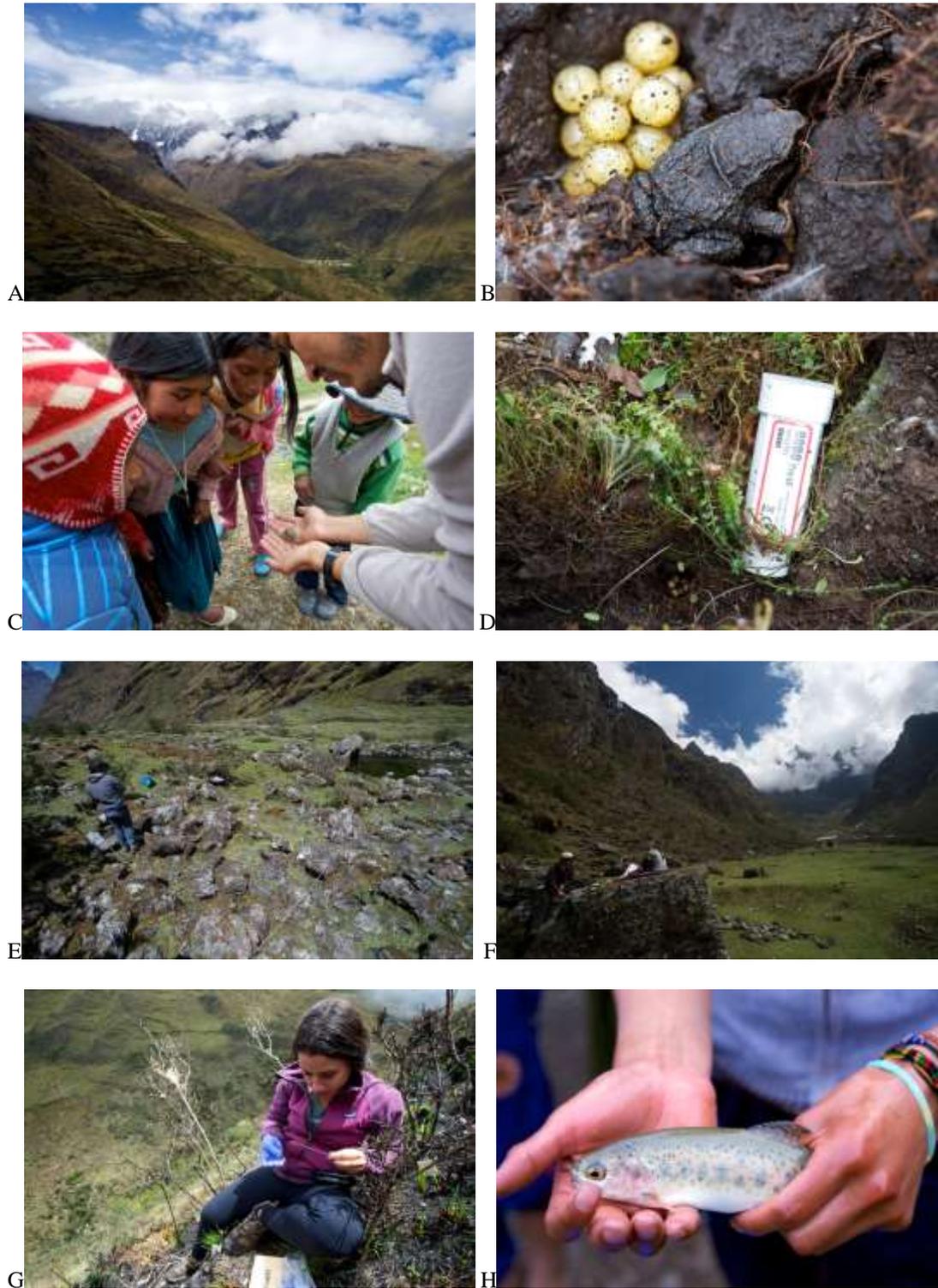
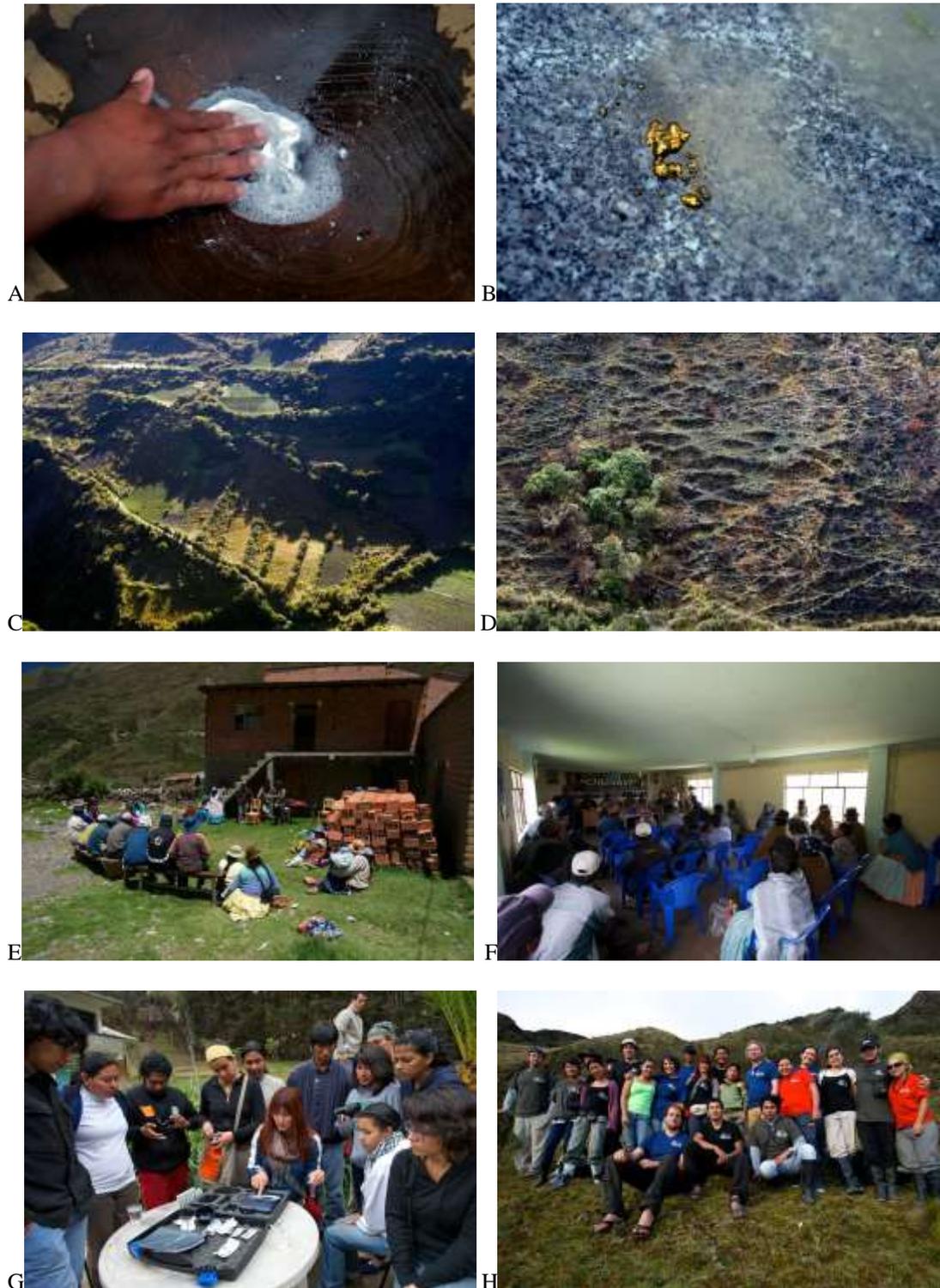


Figure 2: (A) Oscillogram and (B) spectrogram showing a single advertisement call of an uncollected male of *Psychrophrynella illimani* recorded at the type locality (air temperature 16.4 °C). Figure from Willaert *et al.* (2016).



**Figure 3:** **A.** Landscape where *P. illimani* occurs around the village of Totoral at the foot of the Illimani **B.** Male of *P. illimani* with a terrestrial egg clutch. **C.** Local children looking at a captured frog. **D.** Placement of a datalogger near an egg clutch. **E.** A student in one of the quadrants. **F.** Researchers resting near a large gold mine. **G.** A volunteer takes a chytrid sample. **H.** A boy shows a trout from a mercury-polluted river.



**Figure 4:** **A.** A man works bare handed with toxic mercury. **B.** Gold extracted from sand found on the flanks of the Illimani. **C.** Agriculture changes the habitat. **D.** Burnt vegetation and clear marks of the cattle. **E.** Presentation of the project during a meeting of the villagers in Totoral. **F.** Presentation of the project during a meeting in Chuñavi. **G.** A volunteer explains the use of a water quality test kit to the participants of our conservation course. **H.** Group picture with the course participants.



**Figure 5:** Workshops in local communities for teachers (A-B) and children (C-H).



**Figure 6:** Calendars about the project and distributed in the different communities in the study area.



**Figure 7:** T-shirts about the project and worn by volunteers.



**Figure 8:** Design for wall paintings of the frog in different local communities



**Figure 9:** Painting the design on a wall in one of the local communities