CEPF FINAL PROJECT COMPLETION REPORT

Organization Legal Name:	Institute for Adriatic Crops and Karst Reclamation
Project Title:	Locating the wild grapevine (*Vitis vinifera* L. subsp. *sylvestris*) at the river banks of Krka(Croatia)
Date of Report:	June 7, 2013
Report Author and Contact Information:	Goran Zdunić

CEPF Region: **Mediterranean basin, Eastern Adriatic**

Strategic Direction: **3. Improve the conservation and protection status of 44 priority key biodiversity areas, 3.3. Raise awareness of the importance of priority key biodiversity areas, including those that have irreplaceable plant and marine biodiversity**

Grant Amount: **$2700**

Project Dates: **May 01, 2013 to June 05, 2013**

Implementation Partners for this Project (please explain the level of involvement for each partner):

The project was undertaken by the Institute for Adriatic Crops and Karst Reclamation, Split (IAC). Five IAC experts were involved in filed expedition with the aim of finding wild grapevine. The discovered locations and wild grapevine individuals were evaluated by the same IAC staff.
This project was done in collaboration with the National Park Krka (NP Krka), which has provided us with assistance in locating wild grapevines. The area along the Krka river belongs to the protected area under the Croatian Nature Protection Act (Official Gazette No. 70/2005), which is administered by the NP Krka. Therefore, we had to provide a written permission from the Croatian Ministry of Environmental and Nature Protection to be able to perform research in protected area of Krka river. The permission for the research we received from the Croatian Ministry of Environmental and Nature Protection (Document No. UP/I-612-07/13-26/173 from May 17, 2013).

Conservation Impacts

Please explain/describe how your project has contributed to the implementation of the CEPF ecosystem profile.

The project goal was to locate the remaining populations of wild grapevines on the banks of Krka river with the aim to protect this very old plant that is on the edge of extinction. CEPF grants are just focused on the establishment of research and educational projects at the local level and support activities that protect endangered plants. Our activities fit into CEPF strategic direction **3: Improve the conservation and protection status of 44 priority key biodiversity areas, 3.3. Raise awareness of the importance of priority key biodiversity areas, including those that have irreplaceable plant and marine biodiversity.** This project provides an insight on the presence, distribution and the basic characteristics of wild grapevines in the study area which is essential for biodiversity conservation, and management of wild grapevines within the national park (professional care, presentation to the wider range of visitors, etc.).
The results of this study fit into the activities that were planed in the Management Plan of National Park Krka (Document published by NP Krka in 2011; ISBN 978-953-7406-06-6). The area along the Krka river belongs to a protected area in the category of the Croatian National Park. Protection and conservation of plant species is one of the fundamental tasks for NP Krka. The actions we have taken in this project represent an inventory of the existing list of endemic and other plants in the Krka National Park. The data are stored in digital form (GIS database) and will be available NP Krka and the Croatian Ministry of

Environmental and Nature. Recently, NP Krka started GIS database for all plant and animal species that living in the protected area of Krka river. Based on these results it will be possible to implement monitoring program for wild grapevines around the Krka river, implement preventive procedures, improve the education system and visitors, and at the end, to continue further studies of wild grapevines. In addition, inventory is done for a large number of plants and forest vegetation which grow in the immediate vicinity of wild grapevines. That represents an added value of the project and will serve NP Krka for monitoring and protection of these plants.

Please summarize the overall results/impact of your project.

In this project (1) the presence of wild grapevines on five separate locations along the Krka river was determined (Distribution Map, annex 1). Dioecism within investigated grapevines (presence of male and female individuals), morphological characteristics of leaves, natural succession without human intervention and consociation with other woody plants suggest that investigated individuals fit in the subspecies of wild grapevine (*Vitis vinifera* subsp. s*ylvestris*). Each of the five locations (2) was evaluated and grapevine individuals are characterized by a basic set of morphological descriptors (OIV, 1983; GENRES081 2001). The basic geographic information (latitude, longitude, elevation) of the study locations was collected through GPS device, and morphological characteristics of the young shoot, inflorescence and mature leaf was described (Morphology of wild grapevine samples, annex 2). The plant community (3) within about 30 meters from investigated grapevine individuals was determined (Plant communities near wild grapevine, Annex 3). In total 66 plant species was identified on the basis of morphological characteristics using a standard identification keys for forest species (Pokorny, 1994; Pokorny, 1995; Kybalova, 1995; Šilić, 1998). The herbarium (4) of identified forest species that grow close to the wild grapevines was made (Herbarium annex 4). Finally, the photo documentation (5) of each of the five locations and morphological characteristics of investigated grapevine samples was taken (Photo album, Annex 5).
Local residents in the area of the National Park (villages Lozovac, Dubravice, Plastovo, Bratiškovci, Rupe and others) engaged in traditional viticulture and winemaking. The results of this project will be very interesting for the promotion of local wines and the story of a long tradition and rich history of wild grapevines in the area of the Krka river. The landscape preservation in the contact zone between the protected areas and agriculture is priority objective for NP Krka, so the cooperation between NP Krka and the local population is essential for the protection and conservation of this area. The research of wild grapevine fits into the broader context of archaeological research for Krka area, and could explain the process of domestication of grapevine. There are a large number of historical monuments. Particularly, research of caves as a earliest traces of human life (Croatian "ozidana pećina") above the Roški slap seems very important for domestication of grapevine where a large number of ceramic vessels were discovered that clearly show the presence of Neolithic culture (5000-1500 years BC). Analysis of local cultivated and wild grapevines in the protected area may provide answers about the domestication of grapevine in this area, and the results of this study provide a good starting point for future research.

Please provide the following information where relevant:

Hectares Protected: -

Species Conserved: *Vitis vinifera L.* subsp. *sylvestris* (Conservation will be improved due to identification of exact growing locations, informing relevant NP managers, evaluation of those sites for biodiversity and proposed measures for the conservation of those sites.)

Corridors Created: -

Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives.

We have successfully achieved all objectives of the proposed project. For the long-term research goals in the study of wild grapevines, it should be further necessary to perform DNA analysis of collected samples to confirm their genetic affiliation within wild grapevines. Molecular identification and comparison of gained DNA profiles of tested samples with already known sequences from the world DNA database

will enrich the data on wild grapevine phylogeny. This should be interesting to the academic community and from the practical point of view, hopefully open up the possibility of using wild grapevines in breeding programs. Study of the mechanisms of wild vine adaptability in their natural habitats on the Krka river where no intervention by humans is applied represents a scientific challenge and has the potential for improving conventional methods of growing cultivated grapevines. Therefore, the results of this study represent a good starting point for future projects on a wild grapevine in the terms of scientific as well as other project types.

Were there any unexpected impacts (positive or negative)?

The positive impact arose unexpectedly from the research. During the study we determined 66 plant species that grow near the wild grapevine, which was significantly more than we expected. Also, surprisingly positively was the finding about grapevine distribution which was widely present along the Krka National Park. With such appearance, larger than we expected it is more likely to stay preserved.

Project Components

Project Components*: Please report on results by project component. Reporting should reference specific products/deliverables from the approved project design and other relevant information.*

Component 1 Planned: Production of a distribution map with detailed description of the related habitats

Component 1 Actual at Completion: **Distribution map with detailed description of the related habitats**
Information obtained during the project was entered into a digital database. We identified five locations where the wild grapevine was present. The basic geographical information through the GPS (latitude, longitude, elevation) was recorded, and through the ArcGIS software the distribution map on which all information about the population of wild grapevine (the number of individuals, sex) for each location was made. In total, 66 different neighboring plant species were determined and a list of plant communities for each location is made.

Component 2 Planned: Identification of current threats and impact and highlight of hotspot areas for this species

Component 2 Actual at Completion: **Current threats and impact and highlight of hotspot areas for this species**
All five location sites where the wild grapevine was found, are in the protected area of the National Park, so it reduces the possibility of devastating the plants by direct injury or chemical pollution. However, locations 1 (Visovac) and location 5 (Rupe) are exposed to the open access to visitors without official entrance to the park, allowing the possibility of devastating the plants by visitors or local people who may use them for firewood. Close cultivated grapevines in the contact zone between the protected area and agriculture zone suggest the possibility of sexual hybridization between wild and cultivated grapevines. The degree of introgression of cultivated grapevines should be investigated by molecular markers. Fire also poses a serious threat to the wild grapevines and to other plants of forest vegetation community, therefore continuous monitoring is required.

Component 3 Planned: Production of a scientific report/scientific paper with recommendations for conservation and management of this species and some recommendation for future research

Component 3 Actual at Completion: **Scientific report with recommendations for conservation and management of this species and some recommendation for future research**
The presence of wild grapevine was recorded in the area along the Krka river. Morphological evaluation suggests that found individuals of wild grapevine belong to *Vitis vinifera* subsp. *sylvestris* because great number of dioecism plants (male and female) was found which is one of the important morphological determinants of wild grapevines. Morphological similarity of wild and cultivated grapevines is quite large. Experiences of many authors in Europe (Di Vecchi-Staraz et al. 2009, Lopes et al. 2009; Zecca et al. 2010; Ergul et al. 2011, Andres et al. 2012) indicate that within the population of wild grapevines a grapevine hybrids and cultivated grape varieties that "escaped" from the vineyard can be found. Because of that fact, we recommend the analysis of molecular DNA markers to confirm the identity of the observed individuals. We recommend the application at least 9 Simple Sequence Repeats (SSR) markers and analysis of samples of cultivated grapes from surrounding local vineyards.
It is very important to conserve wild grapevine on the site because there are complex hierarchical continuum of ecological scales between species, site and landscape. Therefore, we recommend continuous monitoring and conservation of wild grapevine on original sites along Krka river. NP Krka managers should be adequately educated for management of wild grapevine (e.g. gardening along paths without unnecessary cutting). For the protection of genetic resources of wild grapevines and their further scientific evaluation we also recommend that the collected population of wild grapevine should be vegetative propagated and maintained in the collection nursery repository. In addition, we propose to continue locating wild grapevines on its natural habitats along the Krka river and the expansion of the expedition area to the river Čikola. So far, this could not be done for the shortness of the project duration.

Study of the mechanisms of wild grapevine adaptability in their natural habitats on the Krka river where no intervention by humans is applied represents a scientific challenge and has the potential for improving conventional methods of growing cultivated grapes. Therefore, the results of this study represent a good starting point for future projects on a wild grapevine. Scientific challenge includes new knowledge on grapevine breeding and the study of physiological mechanisms, taking into the account that wild grapevines prefer the immediate vicinity of the water as opposed to the usual habitat of cultivated grapevines which grow on marked dry soils.

It would be interesting to study the degree of association between mycorrhizal fungi found in the soil and root system of wild grapevines as this system works without human intervention in the natural habitat.

Were any components unrealized? If so, how has this affected the overall impact of the project?

No

Please describe and submit (electronically if possible) any tools, products, or methodologies that resulted from this project or contributed to the results.

Distribution Map, annex 1
Morphology of wild grapevine samples, annex 2
Plant communities near wild grapevine, annex 3
Photo of Herbarium. annex 4 (to be completed after the plant tissue will be completely dried)
Photo album of location and wild grapevine samples, annex 5

Lessons Learned

Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community.

This project was carried out within period of one month which is a rather short period for a comprehensive study of wild grapevines in large area. Another important lesson learned is the necessary for a better cooperation with local producers (local farmers and grapevine producers) near the Krka river. The lack of cooperation is likely to result in a smaller number of the founded locations. We assume that with better cooperation more questions about the relation of wild and cultivated grapevine could be answered.

The third important lesson is to include consultant - expert who has experience in the evaluation of wild grapevines, who would contribute to a better review of the existence of wild grapevines in the area of Krka river.

Finally, we did not spend all funding in this project. We have made this savings in large part because we did not spend all funds for travel. We have found wild grapevine very quickly but on the other side there was no so much time for additional filed expedition (travel) because of short period of project. We have saved some funds for supplies too.

Project Design Process: (aspects of the project design that contributed to its success/shortcomings)

Several previous meetings of the researchers from the IAC were very effective for the preparation of a field expedition in the Krka National Park. Given the experience of IAC workers in similar projects which included field expeditions we have been able to previously observe the critical points in the project implementation. The project was designed and led by the project manager and open to the suggestions by the other members of the project team. Communication between the institution relevant for the project realization (IAC as a project manager, National Park Krka and the Ministry of Environment and Nature of Republic of Croatia) was very effective and easygoing. This communication was essential because without the necessary permit to work on the protected area of Krka river provided by the Ministry and NP Krka we would not be able to do research in such short period of time.

Project Implementation: (aspects of the project execution that contributed to its success/ shortcomings)

The project was performed very quickly and very effectively. Management of the project was done by a project manager. Five different expert profiles from the IAC were included in the project team (viticulture,

forestry, molecular biology, microbiology). Initially, we intended to involve 4 IAC people but at the beginning of the project we realized that planned activities would be much efficient if we include one more IAC expert. That additional work was carried out voluntarily. Such an interdisciplinary approach was proved to be very effectively in the terms of locating and evaluating the locations and samples of wild grapevines. The financial management of the project was conducted by an accounting team within IAC. Efficient logistics was provided by the National Park Krka and the Ministry of Environment and Nature Protection of Croatia as a result of good communication and great interests for project implementation.

Other lessons learned relevant to conservation community:

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Additional Funding

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of Funding*	Amount	Notes

Additional funding should be reported using the following categories:

A) Project co-financing (Other donors contribute to the direct costs of this CEPF project)
B) Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)
C) Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)

Sustainability/Replicability

Summarize the success or challenge in achieving planned sustainability or replicability of project components or results.

Results of the project will be beneficial to the Krka National Park management plan. Inventory of large number of plant species along with wild grapevines was done. The exact geographical position found via GPS coordinates will facilitate further plant monitoring for the employees of Krka park. The documentation clearly provides the methodology for evaluation and identification of wild grapevines and other plant species, which ensures repeatability of the project. This study could help to identify a wild grapevine on an adjacent river Čikola and could serve as a good example how to identify not only wild grapevines but other wild relatives of cultivated plants (eg, figs, cherries, strawberries). Our intention is to apply for further funding to replicate our methods for investigation of wild grapevine along river Neretva in Bosnia and Herzegovina. The equipment, skills learnt/bought with these funds (e.g. GPS) will be used for other projects in the same field for further study.

Summarize any unplanned sustainability or replicability achieved.

Safeguard Policy Assessment

Provide a summary of the implementation of any required action toward the environmental and social safeguard policies within the project.

Project activities were conducted in accordance with the Occupational Safety and Health whereby all involved employees respected regulations concerning accident prevention based on the Croatian legislation. Also, during the project we followed the Law on the nature protection and behave nature-friendly.

Additional Comments/Recommendations

Funding for the field expedition that was initially planned within the project was not entirely spent because of the very short period of project time. We intend to organize meetings with the Krka National Park, in which we will present them the project results. Also, our intention is to present the results in a form of preliminary scientific research paper and submit for publication in the scientific journal that monitors the protection, conservation and biodiversity of plant species. We hope find other funding sources to enable this in the future.

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, andpublicized in our newsletter and other communications.

Please include your full contact details below:

Name: Goran Zdunić
Organization name: Institite for Adriatic Crops and Karst Reclamation
Mailing address: Put Duilova 11, 21000 Split Croatia
Tel: 0038521434453
Fax. 0038521316584
E-mail: gzdunic@krs.hr