Short Communication

RESULTS OF THE LIFE ARCTOS/KASTORIA PROJECT

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1. Introduction

This article summarises the results of the project LIFE ARCTOS/KASTORIA (LIFE09 NAT/GR/333) - "Improving conditions of bear-human coexistence in Kastoria Prefecture, Greece: Transfer of best practices". The project was designed by the Environmental NGO CALLISTO specialised in large carnivores' research and management and was implemented between October 2011 and September 2015, in cooperation with local authorities. Coordinating beneficiary was the Region of Western Macedonia, while other associated beneficiary (besides CALLISTO) was the local Development Agency of Kastoria (ANKAS). See the project area in the following maps.

The conditions before the realisation of the project were the following. From 2000 traffic accidents involving brown bears *(Ursus arctos)* evolved into both an important cause of human caused mortality for this carnivore in Greece, and into a serious threat for public safety. According to several memoranda submitted to the competent authorities by environmental organizations (including CALLISTO), there have been 26 fatal road accidents involving bears from 2000 to 2010, 19 of which occurred along the Egnatia Motorway network. Fortunately, no human lives were lost in these accidents.

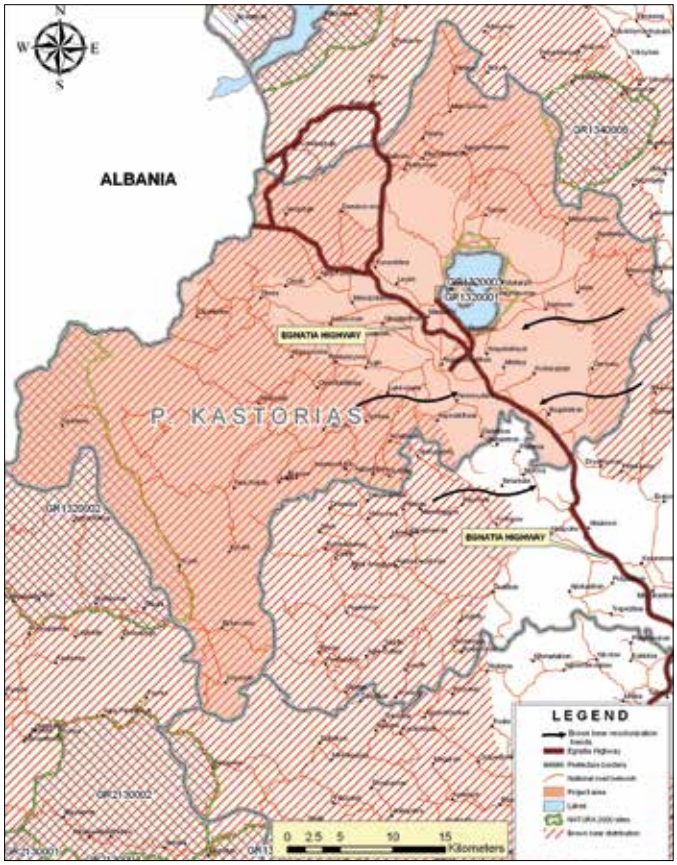

Fig. 1. LIFE ARCTOS/KASTORIA project area.

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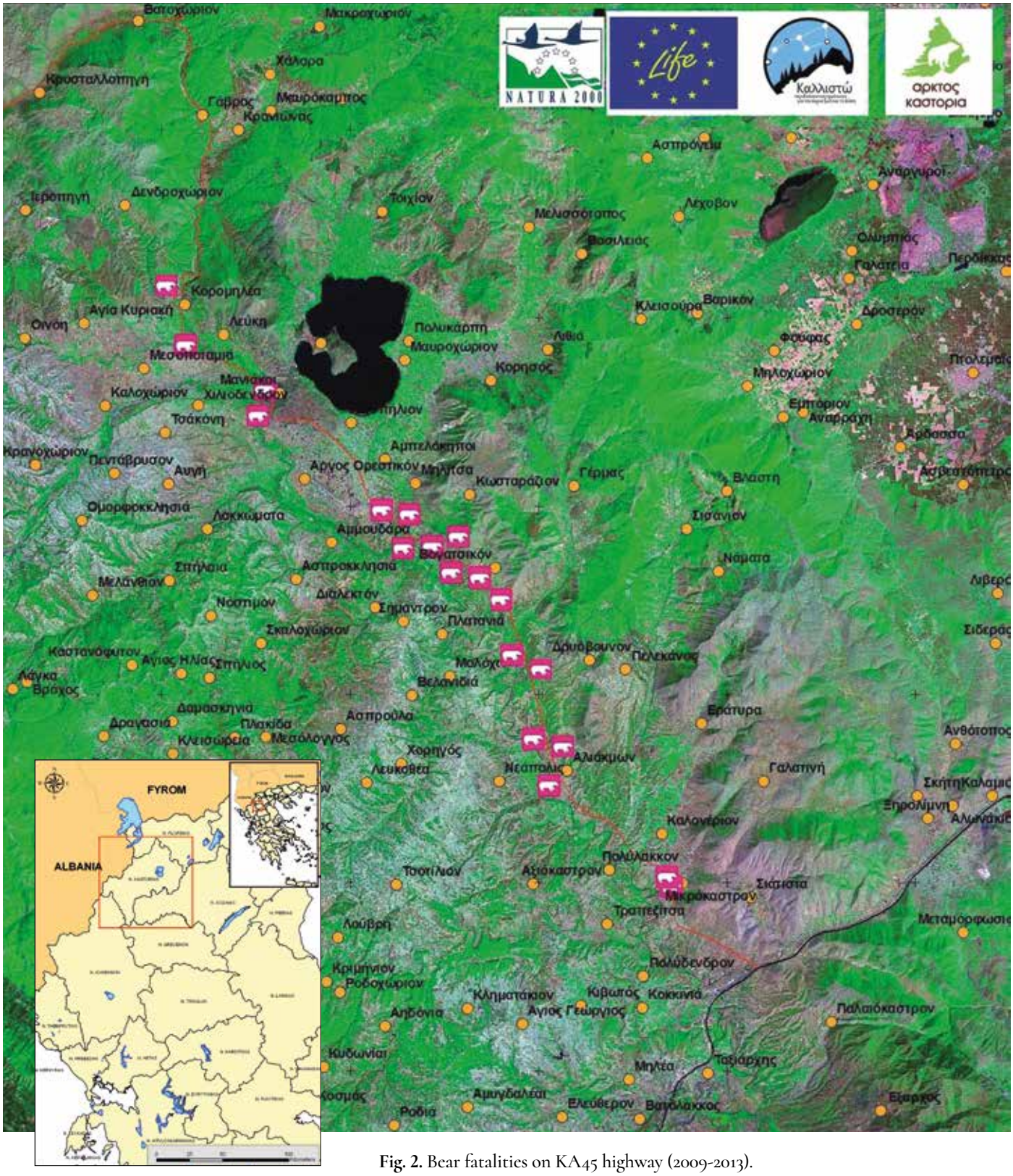

Fig. 2. Bear fatalities on KA45 highway (2009-2013).

The frequency of traffic accidents increased immediately after the construction company handed over the road to traffic in June 2009. During 2009-2010, in the above mentioned areas, there were eight (8) cases of traffic accidents with bears, out of which six (6) died in the end. In summer 2010 an adult male bear (5 years old and weighing about 120 kg) died in a road accident. In this part of the motorway, from 2009 to 2013, totally 19 fatal traffic accidents with bear victims were recorded (Fig. 2). The fence along the road was a conventional one (1.60 m height only, Fig. 3). Moreover, apart from the insufficiency of the fence, no special wildlife passages have been built, nor distinct warning signs and artificial deterrents aiming at keeping wildlife away from the road had been installed, putting the life of both drivers and animals in danger. Actually, the motorway build-

ers had not taken under consideration the presence of bears and other large mammals in the area.

In the same time, in the prefecture of Kastoria there has been an increase in the number of bears that tend to approach residential areas (e.g. villages of Nestorio and Klisoura). In order to address these incidents, specific preventive measures are required. These measures need to be deployed according to a precise technical protocol, depending on the case and the complexity of each incident. It was absolutely necessary, therefore, to establish and operate a special "Bear Emergency Team" (BET), which could intervene to such cases, either providing advices to local authorities (e.g. on management of garbage dumps or small orchards close to villages), or undertaking implementation of recommended methods and techniques (relocation, aversive conditioning).

Moreover, in the district of Kastoria, the agricultural sector (farming, animal breeding, and apiculture) plays a very important role for the economic and social life of the community. The damages caused by bears on livestock, apiaries, fruit trees and crops are a significant nuisance in rural areas and sometimes result in illegal methods of human caused bear mortality. Between 2011 and 2014 192 sheep/goats, 49 cattle, 4 equine and 147 beehive losses were recorded by the Greek Agricultural Insurance Organisation in the project area.

Finally, environmental education programs, awareness-raising campaigns, mobilization of volunteers and involvement of stakeholders, are essential actions for the successful implementation of conservation measures.

2. Results

The project was implemented between October 2010 and September 2015 in Kastoria Prefecture with emphasis on areas of permanent or seasonal presence of brown bears. The most important achievements of the project are presented below, categorized under the 3 major set of actions that have been implemented.

2.1. Reducing-eliminating the phenomenon of road accidents involving bears

Using radio-telemetry data from nine (9) radio-tagged bears and other input from in situ extensive surveys conducted by CALLISTO for identification of sections of the road and highway network

Fig. 3. The conventional fence on the highway before intervention from CALLISTO and the LIFE project.

Fig. 4. WWR (Wildlife Warning Reflector) installed on the jersey of the highway.

Fig. 5. WWR installed on delineator post of a county road.

Fig. 6. WRS (Warning Road Signs) installed on the highway by the project LIFE ARCTOS/KASTORIA.

Fig. 7. WRS installed on a county road by the project LIFE ARCTOS/KASTORIA.

with a high risk of bear traffic fatalities, 5400 optical Wildlife Warning Reflectors (WWR - deflecting the light from headlights of approaching vehicles towards the roadside to create a constantly changing optical warning fence, which prompts large mammals to stop moving or to flee back into the woods/fields deterring wildlife from crossing the road in the path of approaching vehicles, Figs. 4, 5) and 22 Warning Road Signs (WRS – alerting drivers to potential collision with bears and other wildlife species, Figs. 6, 7) were installed along the newly constructed highway as well as the old national and county roads network.

Following successful pressure by CALLISTO, EGNATIA ODOS SA (the company that constructed the highway) installed additional warning signs at crucial points of the highway segments (Fig. 8).

EGNATIA ODOS SA proceeded with the installation of an upgraded 130 km bear-proof fence. The new fence (Figs. 9, 10) has been constructed according specific standards with a height of 3 m, and reinforced,

Fig. 8. Additional WRS installed on the KA45 highway by EGNATIA ODOS SA.

Fig. 9. Installing the "bear-proof" reinforced fence on the highway after successful efforts of CALLISTO.

Fig. 10. Another view of the "bear-proof" reinforced fence, installed on the highway.

Fig. 11. An electric fence installed around beehives near human settlements.

Fig. 12. Bear-proof refuse containers installed by the project near human settlements.

galvanized fencing wire. The distances between the piles, which have been fastened on the ground with concrete, is maximum 2 m.

2.2. Addressing incidents of bears approaching populated areas and supporting implementation of prevention measures to minimize bear caused damages

Following a preliminary assessment of damage caused by bears in the project area, 32 electric fences (Fig. 11) and 40 bear-proof garbage containers (Fig. 12) were placed in high risk human-bear conflict areas.

Following a preparatory phase during which a Livestock Guarding Dog (LGD) owner registry was created (data and useful information were retrieved from databases of all registered farmers provided by the General Directorate of Rural Development as well as the Veterinary Services of the Region of Western Macedonia), a network of LGD owners was developed (23 participants). Whenever a dog owned to a member of the Network was giving birth to puppies, the relevant info was provided to both ANKAS and CALLISTO, who in turn were informing the other members of the network possibly interested in adopting the LGD puppy(ies) (e.g. giving also details on condition of the puppies, gender). The requested puppies were transported either by the interested receiver or the facilitator of the Network employed by CALLISTO. Moreover, during the action's implementation period, an expert (veterinarian), staff member of CALLISTO, provided technical support to the implementation of the action by paying visits to members of the Network, for confirming the quality of the dog/s and for providing advices and veterinarian care for free. Following this procedure, facilitating and monitoring the LGD Owners' Network, twenty eight (28) LGDs were provided to livestock breeders for free, during the project's implementation period. The LGDs provided preferably belong to local breeds: the "Ellinikos Poimenikos" (Fig. 13) and the "Molossikos Ipeirou" (Fig. 14).

A Bear Emergency Team (BET) (consisting of 2 experienced veterinarians and 2 biologists) dealt successfully with approximately 50 cases of human-bears conflict. Moreover, the operation of the BET was in-

Fig. 13. Typical Greek Shepherd Dog (LGD local breed). Photo: Alexis Giannakopoulos.

Fig. 14. Typical Epirus Molossian Dog (another LGD local breed). Photo: Alexis Giannakopoulos.

stitutionalised by the Greek Government after official approval of the BET's operating protocol. The approval was made through a Common Ministerial Decision of the Ministers of Environment, and of Rural Development and Food. Green Fund (a national organisation supervised by the Ministry of Environment, which finances environmental activities) will cover the costs of interventions when necessary.

The project actions contributed substantially to the activation of the Measure 216, Action 1.1 of the Greek Rural Development Programme (RDP) 2007-2013, under which beekeepers and livestock breeders received financial support, in order to cover the cost of purchasing and installing portable electric fences devices, as a means to prevent bear damages on their properties.

2.3. Increasing/enhancing public awareness of the aforementioned issues

An "Eco-Volunteers Programme" was established in the project area, through which ninety two volunteers were engaged. They disseminated leaflets, conducted special meetings (15 in total) and informed more than 500 visitors and residents of the area.

The project printed and disseminated more than 38,000 copies of informative leaflets, brochures, best practice manuals etc. as well as 2,500 copies of posters, regarding different aspects of coexistence between bears and humans, including application of preventive measures.

More than 14 information meetings and seminars were conducted, targeting either the broad public or special groups of stakeholders (e.g. agriculture professionals, livestock raisers and bee-keepers, hunting associations, local authorities' employees).

Thirty (30) environmental education actions were implemented in the project area (18 actions for 307 primary school students, 9 actions for 71 secondary school students, and 3 actions for 60 adults). Educational activities were starting with presentations and discussion on the natural values of the region, the flora and fauna of the area and the problems of bear/human coexistence. They were followed by site visits in representative bear habitats and "hot spots" of bear-human conflicts.

3. Discussion

The technical implementation of the preventive measures has proven to be very straightforward, simple and effective in deterring damage from carnivores to livestock and apiaries. The practical experience that has been accumulated since the early 1990s has allowed fine-tuning of the technical characteristics,

procedures and conditions of these measures.

However, long-term monitoring of carnivore populations and the extent of damage caused by them is also a prerequisite in order to assess the impact of the measures. This requires a close collaboration and coordination between the National Agricultural Insurance Organisation (ELGA), which holds data on carnivore damage and reimbursements, and conservation bodies, such as NGOs and the Management Bodies of the National Parks, which monitor carnivore populations. The inclusion of preventive measures in the Rural Development Programme back in 2003 can be hailed as a major success thanks to the substantive efforts of NGOs. The implementation of the aforementioned measures has failed in the first (2003-2006) and second (2007-2013) programming periods of the RDP, possibly due to the inadequate promotion of the measures to potential beneficiaries, or unduly strict conditions for application. This has implied that a large part of the funds attributed to the preventive measures have been left unused. Nevertheless, a similar measure is included in the national RDP of Greece 2014-2020 (Measure 4.4 - Support for non-productive investments for environmental purposes). Hopefully, the measure will be implemented more effectively.

The efforts so far have been driven mainly by NGOs or LIFE projects aiming at carnivore's conservation, whereas the role of other stakeholders (mainly state authorities) has been relatively limited.

During the efforts to develop the LGD-Owners Network, several practical problems arouse, which are worth-mentioning. The social relationships among some shepherds may in certain cases become a limiting factor (when negative or hostile). Shepherds may refuse to cooperate in efforts to breed and distribute livestock guarding dogs.

Another problem is the lack of trust shown by certain shepherds to the project team. The situation gets even worse when the project team needs to carry an adult genitor from one livestock raiser to another one during the dogs' mating period. Usually shepherds are not willing to carry the dogs themselves as they consider its time consuming.

Several livestock raisers are suspicious regarding their participation in the network as they perceive it as a mandatory commitment which in case of failing to fulfil certain obligations they will be sanctioned. The creation of trust between livestock raisers and the project action team requires a certain time margin, regular contacts and practical activities.

It is frequent that livestock raisers with good quality LGDs usually avoid giving puppies to neighbouring shepherds (with lower quality dogs). This happens because they believe that large carnivores will attack the less well protected flock and avoid the flocks with good LGDs, and thus minimizing the probability of suffering damage. The livestock raisers with this mentality are willing to give puppies only to shepherds based at a much greater distance and with whom they maintain long standing friendly relationships.

CALLISTO was included in the finalists for the Natura 2000 awards with the LIFE ARCTOS/KASTORIA project.

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References

Progress Reports and Final Report of the LIFE ARCTOS/KASTORIA Project (unpublished).