Proposal for investigations into the distribution and use of the landscape of predators and prey in Nar Valley (Nepal).

Reacting to the request by the National Trust for Nature Conservation (NTNC) of Nepal as formulated by Dr. Naresh Subedi, and in support of the PhD research of our PhD student Mr. Ashok Subedi (no family) who conducts research through NTNC (his employer) and Wageningen University (where he is a PhD student) into the behaviour of the Snow leopard and its favourite prey (the wild Blue sheep and the domestic sheep) in the Nar-Phu area of northern Nepal, the following:

Dr. Naresh Subedi requested the support for the purchasing of satellite (radio) collars, to be fitted to Snow leopards in Nepal. His organization, NTNC has obtained the necessary permits for capturing and fitting animals. These animals roam at an altitude between 4000 and 6000 m above sea level. Mr. Ashok Subedi's PhD research is focussed on these animals Their habitat selection and activity patterns, in relation to the very harsh physical circumstances (extreme cold and aridity) led Mr. Ashok Subedi to concentrate on understanding the 'thermal landscape' in which these animals have to operate.

In the Nar Valley, a system of weather stations has been set up by Wageningen University with financial support from the Himalayan Tiger Foundation, and WWF the Netherlands. Further financial support is given by Mr. Siddhartha Rana. The automated weather stations cover a range between 3500 m and 5500 m above sea level. Data that are collected are temperature, wind speed, zenith radiation and reflected ground radiation, with measurements every ten minutes. Moreover, physical models have been constructed to measure the temperature regulation consists of these animals at two base stations at 4500 m. These models run automated, and data have been collected now for 14 months. Finally, the Nar Valley's temperature profiles are measured often by the European Sentinel satellite system.

To enable Mr. Ashok Subedi to optimally conduct his research, which has been stymied by the corona crisis and the lack of sufficient time of his working hours allocated to spending in the field, it can be well-defended that more data should be collected remotely and automized. This can be done by fitting out the predator, and its prey, with satellite collars that collect data and transmit them to an electronic system for later analyses.

A system that is well suited for the purpose consist of a collar, to which a GPS-receiver is attached (for ascertaining the rather precise location of the animals within the terrain) and a temperature sensor (to determine the thermal conditions in which

the animal find itself), and a power bank to deliver the electricity for the GPS receiver and for transmitting the data to a base station. In the base station, the data are stored till someone comes and retrieves the data for analyses. Transmitting the data to a local GSM-network is not possible for two reasons, namely, the GSM-network is switched off during winter due to extreme conditions, and the local system is not very reliable and cannot handle data transmission well according to the provider who owns and operates the system locally. Transmitting the data to a satellite is possible, but the frequency of the measurements will then only be every six hours instead of every 15 minutes with a local base station. Moreover, batteries would last about one year and with the system of a local receiver it is predicted to last two years.

Because Mr. Ashok Subedi's PhD study terrain is the Nar-Phu area, we propose to finance collars for Snowe leopards in the Nar-Phu area only, with the concentration of the catching efforts in Nar. Three collars are sufficient for getting a first understanding.

The Snow leopards main wild prey consist in this area of Blue sheep. Domestic stock (seehp and goat) form an important part of the diet too.

The roaming patterns of the Snow leopards are likely to be determined by (a) prey availability, (b) human avoidance, (c) temperature) and (d) wind.
The wild prey's roaming patterns are likely to be determined by (a) grass availability, (b) predator avoidance, (c) temperature, (d) wind, and (e) avoidance of humans, dogs and domestic stock.
The roaming patterns of the domestic stock are likely to be determined by (a) grass availability, (b) temperature, and (c) wind.

To understand the Snow leopard's roaming patterns, insight in those of their two types of prey is thus essential. For Blue sheep we would be satisfied with five individuals. The catching costs will be relatively high and should be taken into the equation. For the domestic stock, which are the most numerous animals in the Nar-Phu area, we propose five collars. Their catching costs are very low.

The price for a Snow leopard collar is € 450, that for a (blue) sheep (because the neck is thicker) the cost per collar is € 475. Data transmission costs € 99 per collar per year. Two receiver stations would suffice; they cost € 1200 per station, plus a costs of € 99 per year, and exclusive of batteries and solar panels.

Import duties for 2021 in Nepal are 23%.

Budget:

Item	Item cost	Number	Costs
Snow leopard collar	€ 450	3	€ 1250
Transmission costs for 2 years	€ 99	3 x 2 year	€ 594
Blue sheep collar	€ 475	5	€ 2375
Transmission costs for 2 years	€ 99	5 x 2 year	€ 990
Domestic sheep collar	€ 475	5	€ 2375
Transmission costs for 2 years	€ 99	5 x 2 years	€ 990
Base station	€ 1200	2	€ 2400
Transmission costs and maintenance	€ 99	2 x 2 years	€ 396
		Sub-Total	€ 11,370
		Tax (à 23%)	€ 2615
Catching costs (local personnel)	€ 700	3 Snow leopard	€ 2100
Catching costs (local personnel)	€ 450	5 Blue sheep	€ 2250
Compensation costs (owner))	€ 100	5 Domestic sheep	€ 500
		Grand total	€ 18,835
Batteries & solar power	p.m.		
Transport	p.m.		