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Caption: Large Indian Civet *Viverra zibetha*, Tricoloured Munia *Lonchura malacca* and *Hoya wightii* (Medium—pencil crayon on watercolour paper) © Supriya Samanta.



Wildlife managers ignore previous knowledge at great risk: the case of Rivaldo, the iconic wild Asian Elephant *Elephas maximus* L. of the Sigur Region, Nilgiri Biosphere Reserve, India

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Abstract: Management of wildlife depends mostly on scientific data; ignoring this can lead to unintended consequences. We take the case study of the wild male Asian Elephant Rivaldo of the Sigur Region, who was translocated out of his range. Rivaldo returned to his home range within a few days, which could have been expected if scientific publications had been consulted. We suggest that a simple checklist of relevant publications can help park managers to decide on a proper management procedure. We also used a simple Bayesian framework to visually show how the probability of predicting a management outcome is increased by prior knowledge. The expensive and risky effort to relocate the elephant could have been avoided altogether if prior knowledge had been taken into consideration.

Keywords: Asian Elephant, rehabilitation, translocation.

In wildlife management, as anywhere else, decisions need to be taken for which the outcome is uncertain. “Uncertain” however, should not necessarily be understood as “unpredictable”. A typical unpredictable random event is the outcome of tossing an unbiased coin. No knowledge can help predict whether the coin will fall on its head or its tail. A typical uncertain random event is the outcome of tossing a biased coin. By the knowledge acquired that the coin is heavier on one side, it is possible to predict with some amount of confidence that the coin will fall on its head or on its tail. Ignoring

knowledge with uncertain events can have disastrous consequences.

Managing wildlife is more complicated than tossing coins but a management plan is based on objectives that are often uncertain. Recently, the Tamil Nadu Forest Department and wildlife experts had to decide whether to translocate an Asian Elephant called Rivaldo. The success of any elephant translocation certainly depends on many variables managers cannot control, including the elephant’s preferences.

Rivaldo (Image 1) is a 35–40 year old male elephant from the Sigur Region (Figure 1) which forms the buffer zone of Mudumalai Tiger Reserve in the Western Ghats of India. Rivaldo became habituated to human food, partly because he was fed with fruits and sugarcane while being treated for his injuries. However, it was shown that he could be gradually de-habituated if the feeding were to stop (Puyravaud et al. 2016). His familiarity with people and inherent docility made him approachable and a willing recipient of treats from humans, many of whom utilized this opportunity to make easy money by displaying him to tourists. This encouraged Rivaldo to beg from tourists and villagers. In 2020, he entered the gated community of recent settlers and a narrative

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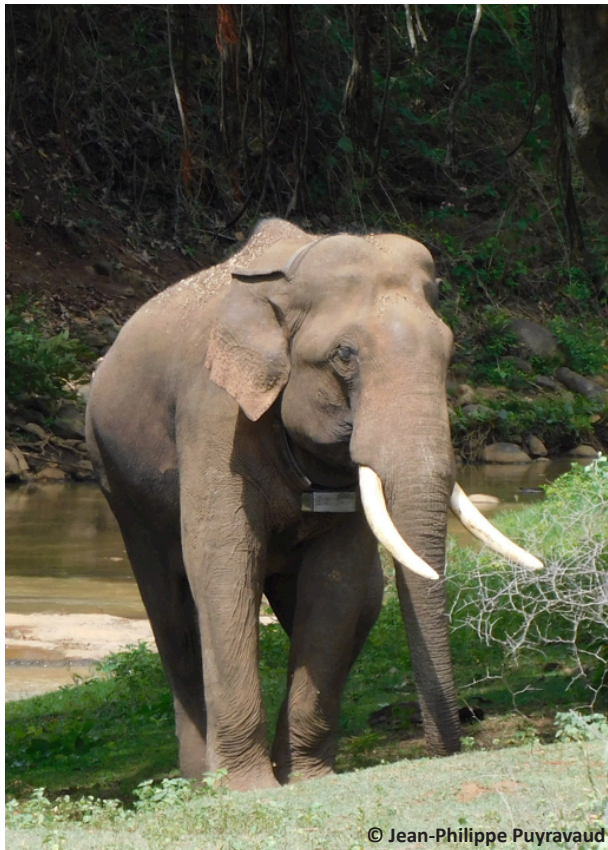


Image 1. Rivaldo in the Sigur Region on 18 August 2021 after his release in Mudumalai Tiger Reserve. Notice his healthy posture and body even though he had not been fed by humans for more than two weeks.

was built according to which the elephant needed rehabilitation in the Theppakadu elephant camp due to some non-existent disability.

The Mudumalai Tiger Reserve authorities ordered Rivaldo's capture, not inquiring with those who knew the elephant well. They also rejected the possibility of rehabilitation (Davidar et al. 2021) proposed as early as March 2020. The elephant was lured into a kraal (a restraint area) in early May 2021 and kept there for approximately three months. The newly appointed chief wildlife warden, however, reviewed the case in July 2021 and concluded that the capture was not based on solid grounds. He rightly ordered the elephant's release.

As Rivaldo was in the kraal, releasing him had to be done cautiously and several options were available, but translocation was preferred. We don't really know why translocation was chosen but we imagine that the aim of this option was to assess whether the elephant would settle down in another habitat far from where he was being fed. By this measure, a long rehabilitation program could be avoided and Rivaldo's problem forgotten. If this was correct, then we can say for the sake of this paper that the management objective was: "Rivaldo will not come back to his original range in less than a week". This objective is sort of a gamble over an uncertain event, depending a lot upon the individual animal's inclinations.

The likelihood for managers to predict correctly the outcome of a project increases with a fair review

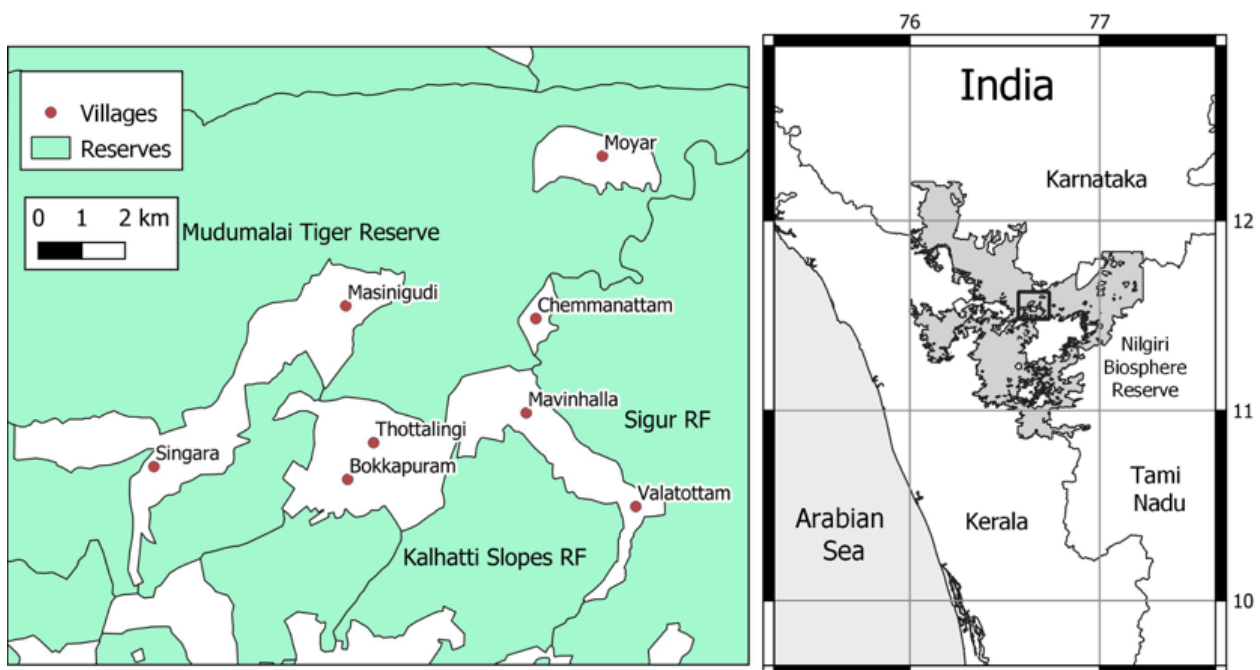


Figure 1. The Sigur Region, Rivaldo's approximate range.

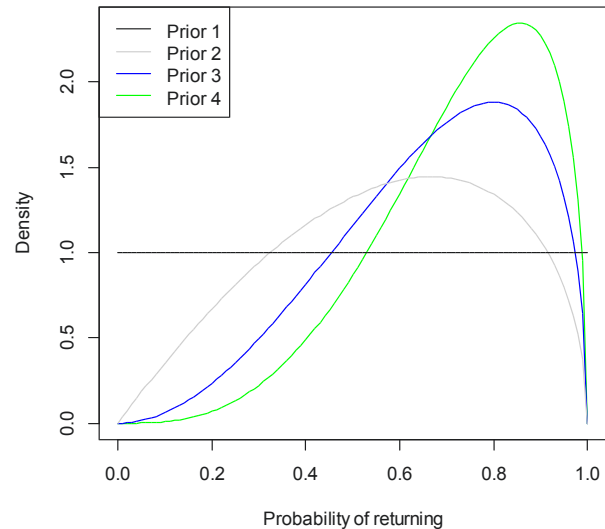
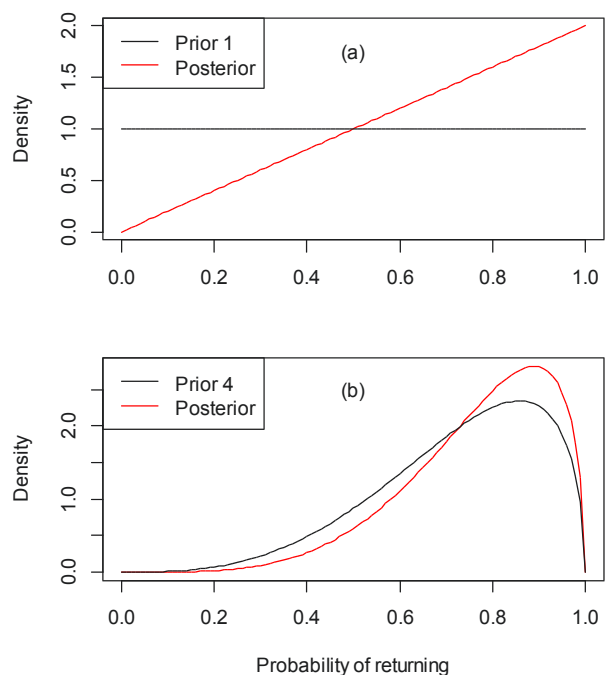
Table 1. Listing published knowledge of elephant behavior increases the probability of predicting operational success.

Accepted hypothesis / observations and references	Translocation likely to succeed?	Translocation likely to fail?
Elephants have ranges (Baskaran et al. 2018a)	0	1
Elephants like human food (Puyravaud et al. 2016)	0	1
Elephants are social (De Silva & Wittemyer 2012)	0	1
Translocation is dangerous (Fernando et al. 2012)	0	1
Translocation is an added cost	0	1
Total	0	5

of published scientific literature. This generally suffices to get a good sense of what may be expected. In this instance, translocation is a difficult choice because it is expensive and increases the risk of mortality of the target animal (Fernando et al. 2012). Moreover, elephants have home ranges (Baskaran et al. 2018a), are highly social (De Silva & Wittemyer 2012), and prefer certain habitats (Baskaran et al. 2018b). Furthermore, mature adult male elephants translocated out of their original protected area tend to return to their home range, often hundreds of kilometers away, whereas young adult elephants tend to wander or settle in their new home (Fernando et al. 2012). With a simple list of publications (Table 1), managers can easily get an idea about the appropriateness of a plan. In this instance, published literature did not weigh in favor of translocation.

In order to maintain objectivity, managers must remember that results published in scientific journals can be open to criticism, but are fairly solid. They represent an excellent basis upon which to argue in favor of or against a given course of action. Reports such as the Right of Passage (Menon et al. 2005) and its sequel which are well-known among elephant specialists did not go through the rigorous peer-reviewed methodological assessment of scientific papers. In consequence, in spite of their wide recognition, such reports cannot be considered on par with peer-reviewed manuscripts. Lastly, expert opinion is probably less reliable than reports and should be accepted only if absolutely nothing published exists on the matter. Managers should also remember that they will have to deal with the consequences of their decisions when their expert advisors have gone back to the comfort of their academic abstractions. Consequently, we cannot stress enough the importance of published scientific evidence.

Taking wagers on management objectives or

**Figure 2.** Prior density distribution depicting accumulated knowledge over elephant ranging.**Figure 3.** Best Priors and Posteriors when (a) no knowledge of elephant ranging is taken into consideration, and when (b) elephant ranging behavior is taken into consideration.

hypotheses can actually be described with statistics. It is not necessary to use statistics while reviewing scientific literature as we did above. Our purpose here is just to show that accumulation of knowledge increases the chance of taking an appropriate decision. The “chance” distribution can be powerfully depicted

with Bayesian statistics, a branch of statistics that has become mainstream in conservation and ecology. These techniques make statistical abstractions such as accumulation of knowledge tangible and comprehensible with simple graphs. In the following, we attempt to develop an intuition using techniques that are well described in Donovan & Mickey (2019).

Bayesian statistics call “Prior” the statistical knowledge about a phenomenon before an experiment, and “Posterior” the new statistical knowledge transformed by an experiment. If we don’t know what an elephant might do after translocation, it is the same as saying that it can come back after one week or not with equal chances. The Prior in this case is a flat line (Prior 1, Figure 2). The chance or probability distribution indicates that anything is possible. But if we take into consideration only one of the papers referring to translocation cited above, for example the fact that elephants are attached to a range, then the Prior is transformed. The Prior 2 (Figure 2) shows that we have a weak “belief” (the strength of evidence) that Rivaldo might come back in a week’s time and its curve shows that there is a fair chance that he will not come back. Taking into consideration other published papers, Prior 3 and Prior 4 reinforce our “belief” that the elephant will come back in a week’s time: the area under the curve for the Prior 4 shows more than a 50% chance of returning. With increasing knowledge, the shape of the probability distribution tends to provide a clearer and clearer message. The strength of evidence accumulated becomes stronger and stronger.

We know today that Rivaldo came back to his home range in 1–2 days after the attempted translocation. With this outcome our knowledge has increased a little further, which will be described by the “Posterior”.

If we started assuming the Prior 1 (Figure 2) was the best, the experiment result (Rivaldo coming back in less than a week) would produce a Posterior that is unexpected. In Figure 3(a) the flat, uninformative Prior

provides a tilted Posterior: this indicates that our “beliefs” were seriously inadequate. If we started assuming the Prior 4 (Figure 2) was the best, the same experiment result (Rivaldo coming back in less than a week) confirms the general trend of the Prior. The Posterior (Figure 3(b)) only slightly shifts towards 1, which confirms further that adult male elephants are attached to their range.

To conclude, it is very important that managers do not confuse unpredictable events with uncertain events that both contain an element of randomness. Ignoring published scientific knowledge in wildlife management is like playing against a person who has a biased coin: the price for playing this game can be high, and an elephant translocation effort is indeed costly.

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