While in some laboratories there are strict protocols concerning the disposal of the waste they produce, most others are largely ignorant. However, we can no longer afford to be ignorant considering the depth of the problem. Further, while some research institutes do have facilities to manage or treat their laboratory waste, the efficiency of the same is questionable. For instance, a number of large Central and State universities in the country house scientific research facilities across diverse fields such as life sciences, physical sciences, chemical sciences, biotechnology, environmental sciences, earth sciences and so on. Waste generated from each of the above facilities is characteristically different. Therefore, the same laboratory waste-treatment plant may not be able to address the diverse waste categories. Considering that most of the waste is extremely hazardous to human health and the environment, we doubt whether these universities actually have special laboratory waste-treatment facilities according to the characteristics of the waste produced. The last few years, for instance, have observed a significant growth in nanoscience and nanotechnology research. Some nanoparticulate forms show unusually high reactivity, especially for fire, explosion and catalytic reaction. Therefore, disposal of waste produced from nanomaterials requires specific handling considerations. Are research establishments in India equipped enough to take care of such distinct waste streams? The answer to the question remains unsatisfactory.

Laboratory waste is a complex category of waste. Considering its hazardous nature, its management and treatment are equally complex. Through this letter, our aim is to attract attention of the generators of laboratory waste, policymakers and other associated stakeholders towards addressing this grave concern in an adequate detail. Stringent implementation of laboratory waste management protocols is the need of the hour. We believe that the growth of scientific research should be accompanied by responsible actions towards managing the waste produced from various experimental activities. Otherwise, our scientific research laboratories would end up creating a complex problem simultaneously while trying to find solution to an issue of scientific significance.

1. http://www.uow.edu.au/context/groups/public/@web/@sci/@chem/documents/doc/uow016883.pdf
2. http://www.ncbi.nlm.nih.gov/books/NBK-55878/pdf/Bookshelf_NBK55878.pdf

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Drones: new tools for natural risk mitigation and disaster response

When a natural disaster occurs (earthquakes, tsunamis, volcanic eruptions, landslides, hurricanes, tornadoes, floods, avalanches, wildfires, etc.) emergency rescue operations are critical to save lives. Many people trapped after such disasters, for example, under collapsed buildings, may have a good chance to survive if they are rescued on time. It is well known that the probability of success of the rescue operations decreases exponentially as function of time to be close to zero after about a few hours. As reported by the Tokyo Fire Fighting Department Planning Section (New Fire Fighting Strategies, Tokyo Horei Publ., 2002), the survival rate reduces as time passes; rescue in 3 h is desirable and the survival rate becomes drastically low after 72 h (the golden 72 h).

Promptness and effectiveness of rescue operations are then essential to minimize the number of disaster victims. Maps of damage distribution might allow to drastically improving the effectiveness of rescue operations. Maps constructed quickly in the wake of a disaster are useful tools for identifying and assessing damage, especially when combined with images of the area before the disaster. The centres for post-event emergency management could use these maps to decide the action priorities in order to minimize the loss of human lives, along with optimally managing the available resources, thus reducing the impact of the natural disaster on an urbanized area.

Unfortunately, in the aftermath of a disaster, mapping may take too long using satellites or traditional manned aircraft. Currently, satellite imaging technology cannot penetrate cloud cover, often leading to delays in image capture after extreme weather events. However, the recent technological developments in the field of drones might overcome the limitations of satellites or traditional manned aircraft, contributing to an efficient system for natural risk mitigation.

Drones, also referred to as unmanned aircraft systems (UAS), unmanned aerial vehicles (UAV) or remotely piloted aircraft (RPA), are aircraft without a pilot on-board. Drones are generally remotely controlled by a pilot located on the ground or on-board another aircraft, or by an autonomous piloting system. In recent years, the miniaturization of sensors and control systems has provided a boost in the development of aerial drones.

Aerial drones are some of the most promising and powerful new technologies to improve disaster response and relief operations. Drones could complement traditional manned relief operations by helping to ensure that the operations can be conducted in a more safer, faster and efficient manner. Rapid deployment of drone-based remote sensing systems after a disaster, combined with high-resolution 'before disaster' maps, could help the disaster relief groups to obtain situational awareness and knowledge about which infrastructure is at the greatest risk. Drones could provide unique viewing angles at low altitudes, not possible from manned aircraft.

The main benefits of drones in an emergency are reach, speed, safety and cost. They can provide the needed aerial data in areas considered too hazardous for people on the ground or for manned aircraft operations, such as sites with nuclear radiation contamination, or those in close proximity to wildfires. Drones can fly through the dark, along a programmed path that covers the whole damaged area, using a live-stream night-vision footage to people on the ground, locating survivors amidst the rubble. Unlike manned helicopters, drones create very little noise and can even be fitted with advanced audio devices to pick up hard-to-hear sounds to help locate survivors.

In conclusion, drones are able to assist in risk assessment, mapping, and planning and in reducing the exposure to danger of the disaster workers. Thus the drones could be considered as an effective tool for future disaster response.

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Rajaji Tiger Reserve: conservation opportunities and challenges

The world-famous Rajaji National Park (RNP; 29°15′–30°31′N, 77°52′–78°22′E) Uttarakhand, India has recently been notified as Rajaji Tiger Reserve (RTR). This Protected Area is now the 48th Tiger Reserve in the country and the second in Uttarakhand. Declaring RNP as a Tiger Reserve is noteworthy because it sustains a wide range of endangered animals in the upper Gangetic plains, especially the Asian elephants and tigers. Besides RTR has a great conservation value, since it is an important part of Terai-arc landscape between the Yamuna and Sharda rivers, which is known as Rajaji–Corbett Tiger Conservation Unit (RCTCU, *c.* 7500 km^2). This Conservation Unit in northwest India is one of the eleven level-I Tiger Conservation Units identified in the Indian subcontinent for the long-term conservation of tigers[1].

Though RNP was established in 1983, final notification for the Park was issued in 2013 because of non-settlement of rights of the local people, which provided a full-fledged legal status to it and strengthened the conservation activities. Further, in 2002, this elephant range was also designated as the 11th Elephant Reserve in the country, naming it the Shivalik Elephant Reserve (*c.* 5405 km^2). In addition to existing core area of 819.54 km^2 of the RNP, now a few portions of Laldhang and Kotdwar forest ranges of the Lansdowne Forest Division (LFD) and Shyampur forest range of the Haridwar Forest Division (HFD), which is 255.63 km^2, have been merged under the RTR area, making it about 1075 km^2 in area. This also includes some portions of Bijni forest of the Gohri forest range of the RNP. The LFD, which has been merged with RTR, is now the tenth forest range of the RTR[2]. All these forests are now the buffer zones of the RTR. On one hand, it would facilitate requisite conservation opportunities, especially in habitat management and conservation of tigers and other wildlife and on the other hand, several conservation challenges would also come forward before the frontline staff of wildlife. Conservation challenges would be more critical in the situation when the RNP is holding about 11 tigers[3].

The population of tigers in the RNP during 2006–2010 was recorded to be stable; in 2006 the tiger abundance was 14 (11–17), whereas in 2010 it was 11 (8–15) (ref. 3). However, their occupancy recorded an increase from 390 km^2 in 2006 to 736 km^2 in 2010. Even in 2000, the estimated number of tigers on the west bank of the Park was only 5–10 animals[4]. A study carried out on the status of tiger and leopard in the RCTCU during 1999–2000 revealed that tigers are not utilizing the west bank of the Ganges, i.e. the southwestern part of the RNP[5]. This study indicated that there could be 6–10 adult tigers in the entire 1500 km^2 habitat block, which includes the forest divisions of Shivalik, Dehradun, Narendranagar and Rajaji–Motichur area of the RNP.

Since the last two decades, the RNP has witnessed a stable population of tigers, though the Park has been considered as a favourable breeding ground for tigers. As LFD and HFD adjoin the RNP, therefore based on landscape level planning a feasible habitat management proposal could be formulated to strengthen tiger movement across the RCTCU. Further, the Rajaji–Corbett wildlife corridor could be restored, which would facilitate the movement of tigers and elephants across the RCTCU. Besides, few other important connecting corridors, namely Motichur–Chilla, Motichur–Gohri, Motichur–Kansrao–Barkot and Rawasan–Sonanadi could also be restored within the newly established Tiger Reserve. The provisions of the Wildlife (Protection) Act, 1972 could be effectively implemented through the participatory approach, which would be helpful in monitoring the movement of tigers in remote areas of the Reserve.

Declaring the National Park as a Tiger Reserve would also ensure effective management and monitoring of tiger population across the entire landscape and in contributing to the country-level assessment. Among the nine forest ranges of the RNP, four remain open to tourists every year for seven months (15 November to 15 June). It is clear from the tourist influx rate that their number has since increased, compared to that during the last 5–6 years. While nearly 19,300 tourists had visited the Chilla forest of the RNP in 2008–2009, their number further risen to nearly 22,450. Successful implementation of the eco-tourism plan would be helpful in reducing the man–animal conflict and would also ensure active participation of the local community in conservation initiatives[6]. While framing the activities under the eco-tourism plan, we can also consider bird-watching as one of the components, since several migratory birds arrive in the RTR during winter, including the ruddy shelduck (*Tadorna ferruginea*), common poachard (*Aythya farina*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), bar-headed goose (*Anser indicus*), painted stork (*Mycteria leucocephala*) and black-necked stork (*Ephippiorhynchus asiaticus*)[7].

Providing a natural connectivity for frequent movement of tigers is one of the major challenges, which has to be addressed on a priority basis. The broadening of Haridwar–Dehradun national highway (No. 72; which passes across the RTR) to four lanes could affect the movement of wild animals across the Motichur–Chilla, Motichur–Gohri and Motichur–Kansrao–Barkot wildlife corridors. Keeping in view the importance of biodiversity and animal movement across these corridors, efforts are also being made to facilitate a natural connectivity for the animals to move across