1 January 2001–31 October 2011. The impact i is then computed as C/P. While P and C are quantity measures (output and outcome respectively), i is inherently a quality measure. One can think of P as being equal to i^0P, and C as being equal to i^1P. Thus P and C can be thought of as zeroth-order and first-order performance indicators. In continuing this as a series of the parameter spaces, the product iC (also i^2P) is an energy-like term (called exergy X), which can be thought of as the second-order performance indicator, and is a scalar measure of the scientific activity during the window concerned that takes into account both quality and quantity. We see from Table 1 that research in USA during this period is far ahead of the other countries. In exergy terms, USA is now nearly four times as active as France and five times more active than China.

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Why does *Apis dorsata* F. forage on brackish water and other non-conventional sources?

The honey bee (*Apis dorsata*) collects a number of substances to ensure its survival such as nectar, which the adult bees convert into honey and store in beeswax cells; pollen, which provides most of the protein, amino acids, fats, vitamins and mineral requirements of a bee's diet; and water, which the bee collects to help maintain the temperature and humidity of the hive and dilute the stored honey for consumption[1]. Besides collection of nectar and pollen, the bees forage for water. They mostly prefer saline, brackish water to fulfil their salt requirements[1]. In an observation recorded during June 2010 in Jammu, India, *A. dorsata* F. was found to collect water from animal wastes flowing outside from animal sheds (Figure 1). The observations were made for seven consecutive days, from 10 to 15 h for 10 min at the beginning of each hour. The number of bees ranged from 3 to 10, with an average of 5.20 ± 1.20 ($n = 42$) bees/min.

Based on this, experimental trials were conducted under caged conditions for five days, in which the bees were given a choice between normal and animal waste water. In order to attract the bees, sugar in the ratio of 1 : 1 was added to both types of water. Forager bees were collected from the field during peak activity hours between 10 and 11 h and starved for 2 h before providing them sugar syrup prepared in normal and animal waste water. The observations were recorded at hourly intervals for 10 min at the beginning of each hour. Of the total number of foragers attracted to both types of water, it was found that on an average 33.33% bees (range 15–55%) were attracted to sugar syrup containing animal waste water and 20% bees (range 5–45%) to normal water, thereby indicating that the sugar syrup containing animal waste was much preferred over normal pure water.

Why do the bees forage on animal wastes? The answer to this question can be traced from the fact that bees have requirement for water, salts and amino acids[1,2], which are available in animal wastes including urine. Approximately 95% of the volume of normal animal urine is made up of water and the other 5% consists of solutes (chemicals that are dissolved in water) which are classified as ions (sodium (Na^+), potassium (K), chloride, magnesium (Mg^{2+}), calcium (Ca^{2+})), organic molecules (urea, creatinine, uric acid) and other substances/molecules found in small amounts like carbohydrates, enzymes, fatty acids, hormones, pigments and mucins (a group of large, heavily glycosylated proteins found in the body)[3]. Thus animal wastes can fulfil the water and chemical requirements of bees, which have been reported to require 10 amino acids for their normal growth[4]. In earlier studies also, a variety of phytophagous Heteroptera, Hemiptera and some tropical butterflies (Lepidoptera) have been reported to feed on non-plant food sources such as bird droppings, dung and carrion[5]. Mateus and Noll[6] found that among bees (Apoidea), the only records of feeding on non-plant food sources involve the members of the tropical subfamily Meliponinae (stingless bees). They occasionally collect faeces and carrion, and *Trigona hypogea* is an obligate necrophage, using carrion instead of pollen as a protein source. Honey bees may sometimes use non-floral resources such as honeydew or bacterially induced plant exudates, but these are to be considered just barely modified plant products. Herrera[7] was the first to report temperate (*Bombus terrestris*) and tropical (*Bombus ephippiatus*) bumble bees feeding on carrion, bird droppings, animal urine and mammalian faeces. A search for sweat has been observed among stingless bees, honey bees and halictid bees[8,9]. The habit of licking sweat was observed in *Apis mellifera* and in *Plebeia* sp.[10]. Some bees have been reported to collect fungal and

Figure 1. *Apis dorsata* collecting water from animal wastes/brackish sources.

rust spores to supply the needs of their colony, when sufficient pollen was unavailable[11–13], whereas in others it was obligate necrophagy[14]. Although most bees feed on nectar and pollen, the behaviour of *A. dorsata* observed in the present study collecting animal urine to overcome its water and nutritional requirements has not been reported earlier.

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Recession of Milam Glacier, Kumaon Himalaya

Here we report the field evidences observed at Milam glacier, Goriganga basin, Kumaon Himalaya during the glaciological expedition carried out in July 2011 and the observations from Resourcesat-2 LISS IV data. An earlier article[1] on the recession of the Milam Glacier derived from satellite data had shown the glacier receded laterally by 1328 m from 1954 to 2006. An analysis carried out using the recently launched Resourcesat-2 LISS 4 (5.8 m spatial resolution) data acquired on 30 October 2011 (Figure 1 *a*) showed some interesting results. The results are based on satellite data combined with *in situ* expedition carried out in the Goriganga valley. During the field

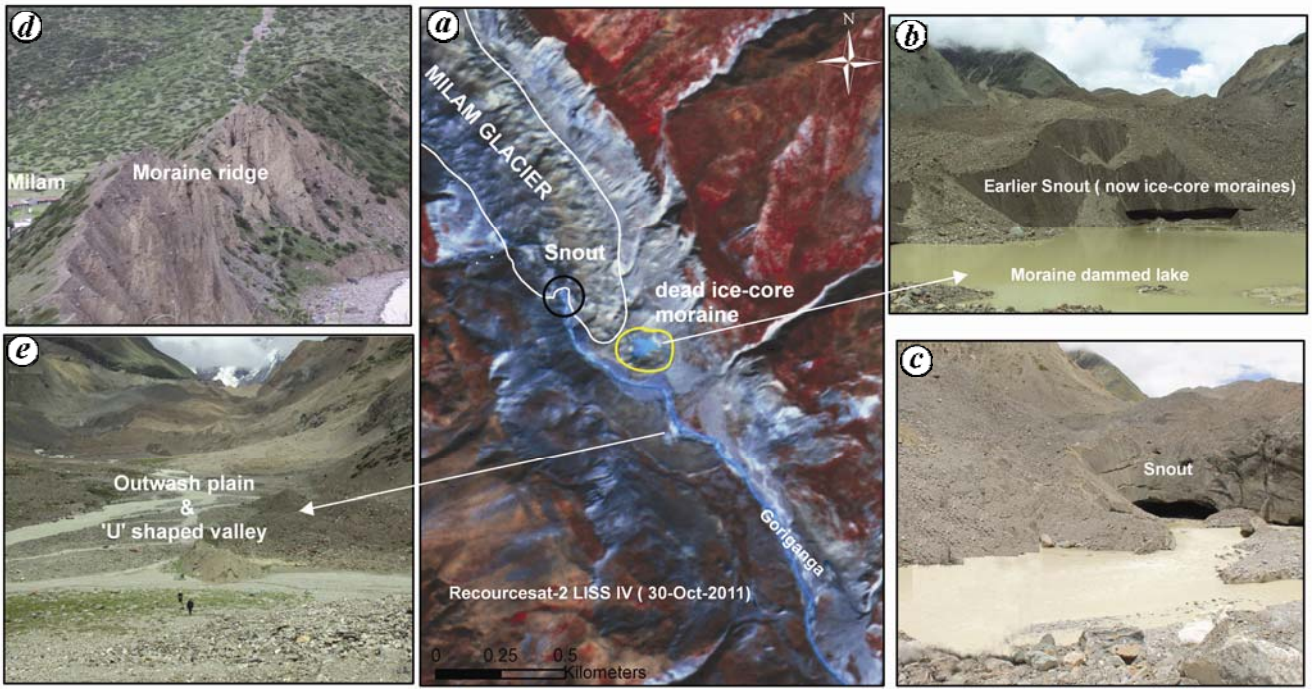

Figure 1. ***a***, Resourcesat-2 LISS IV data showing the Milam Glacier and the moraine dammed glacial lake. ***b***, Moraine dammed glacial lake encircled by the ice-core moraine. ***c***, Present snout of Milam Glacier with the melt water coming out from the cave at the bottom. ***d***, Long lateral/medial moraine near Milam village. ***e***, Outwash plain and U-shaped valley of Milam Glacier.