Knowledge and perception about invasive alien plant species in Chandak-Aunla Ghat and Hat-Kalika of Kailash Sacred Landscape, Pithoragarh, Uttarakhand

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Introduction:

- Second highest threat to biodiversity after habitat destruction (Hobbs & Humphries 1995).

- Increase the risk of wildfires and interfere with forest regeneration

- Affect wildlife habitat, destroy natural pasture, displace native trees, and reduce forage availability (Admasu 2008).

- Can reducing species richness, abundance of native biota (Winter et al., 2009).

- Effect genetic variation, and disruptions of mutualistic networks (Schweiger et al., 2010).

- Change habitat and ecosystem functioning & complete transform the whole landscapes (Richardson et al., 2000).

Key issues identified during Ecosystem Management plan

(i) Degradation of watershed leading to shortage of drinking and irrigation water;

(ii) Degradation of ecosystems

(iii) Poor economic returns from agriculture and apathy towards indigenous agricultural crops;

(iv) Crop raiding by wild herbivores and other agricultural pests;

(v) Lack of institutional mechanisms and enabling environment for implementing the management plan.

Study area:

The present study was carried out in two sub-watersheds, i.e. Chandak-Aunla Ghat and Hat-Kalika located

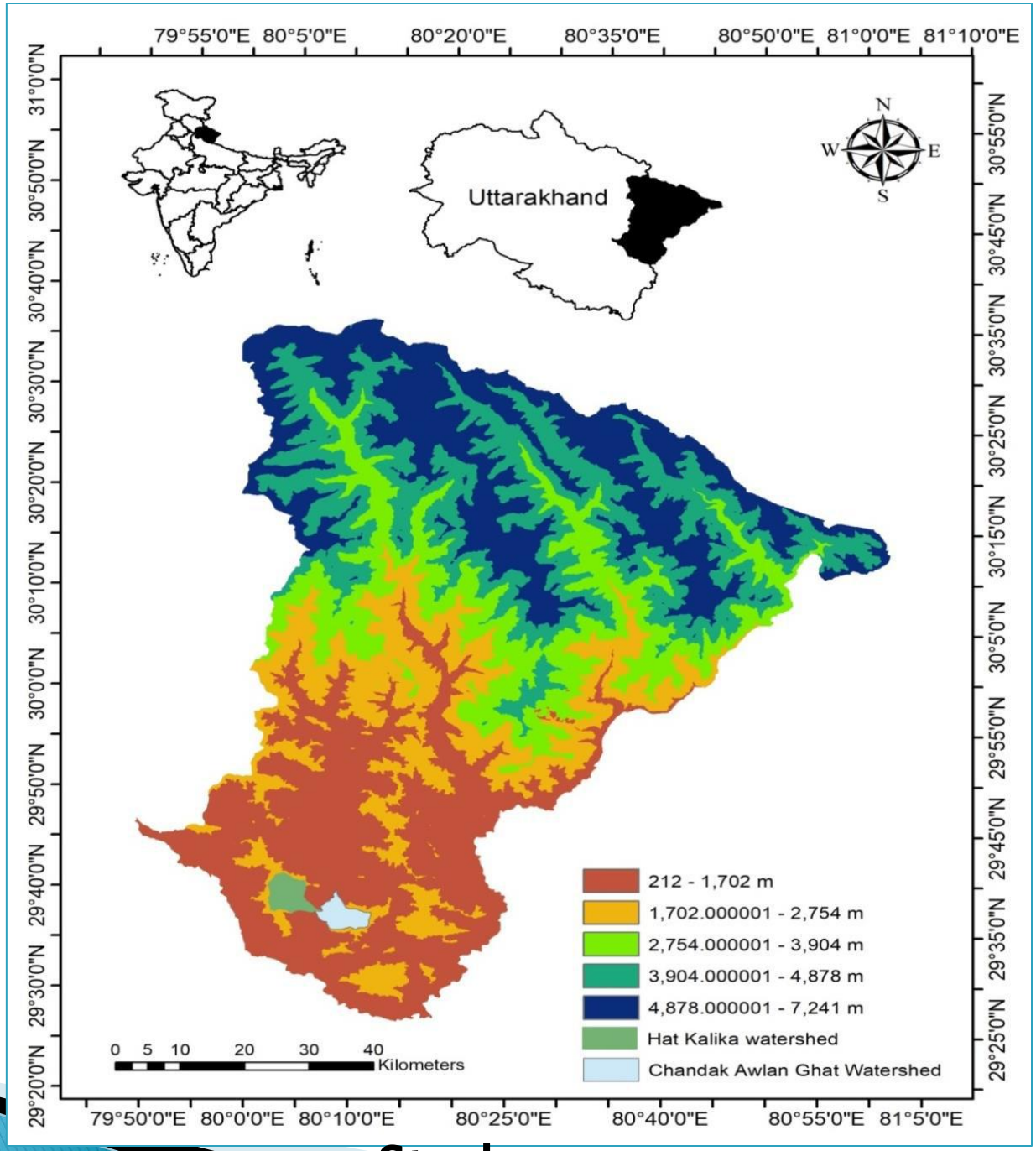
Chandak-Aunla Ghat (29°37'0.36" N and 80° 9'42.05" E)

elevation ranging 607 and 2119 masl

encompasses an area of 23.23 km^2 in Bin block.

Hat-Kalika watershed (29°39'-22.99' N and 080°03'- 38.93'E)

Area of 36.68 km^2 at an elevation 625 -2150 masl.


79°55'0"E
80°5'0"E
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80°35'0"E
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Uttarakhand
N
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212 - 1,702 m
1,702.000001 - 2,754 m
2,754.000001 - 3,904 m
3,904.000001 - 4,878 m
4,878.000001 - 7,241 m
Hat Kalika watershed
Chandak Awlan Ghat Watershed
0 5 10 20 30 40
Kilometers
79°50'0"E
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80°40'0"E
80°55'0"E
81°5'0"E

Study area

Method:

A total of 701 randomly selected household in **45** villages

(Chandak-Aunla Ghat: **329**, Hat-Kalika: **372**) were surveyed

between April 2016 and June 2018

Questions regarding existing invasive plant species, introduction of AIP's, establishment, spread, impacts, usage and management measures were asked

to adult males (30-90 years), female (25-75 years) and students (>18 years) using semi-structured open-ended questions.

The surveys were supplemented by a vegetation survey

Questionnaire survey

Two quantitative index; Relative frequency of Citation (RFC) (Vitalini et al. 2013) and Knowledge Richness Index (KRI) (Araújo et al. 2012) were used.

The formulae used for assessing both the indices are as below:

$$\text{RFC} = {}^{FC_i}/_{N}$$

$$\text{KRI} = {}^{1}/_{\sum J_{i^2}}$$

$$J_{I^2} = {}^{FC_i}/_{FC_n}$$

Where,
FC_i= number of informants mentioning the ith invasive alien plant species,
N = total number of informants participating in the survey,
FC_n- Total record of invasive alien species (S_i) cited by the community.

The value of RFC range between 0 and 1, 0 reflect respondents have no knowledge and 1 indicate better knowledge of invasive alien plants species.

The KRI values range from 0 to infinity where lower values indicates a higher knowledge of alien invasive plants and vice-versa.

Results:

Knowledge about IAP's

A total of 14 species of IAPS plants were reported

(Chandak-Aunla Ghat: 14 species, Hat-Kalika 9 species) with an average knowledge of 2.7±0.03 species (range 1-5 IAPS).

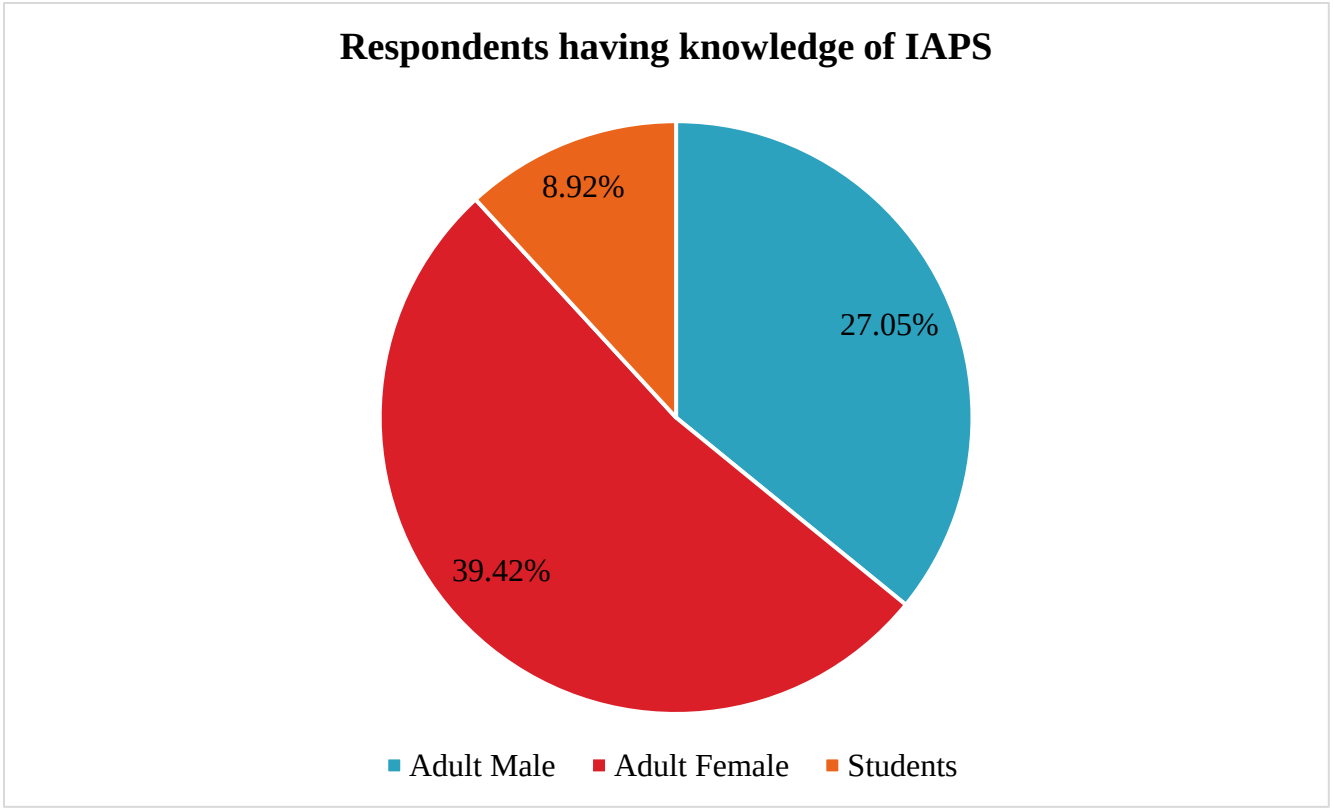
More than half the respondents in watersheds (58%) were aware of IAPS,

The knowledge was found to be more in Chandak-Aunla Ghat (82%) than Hat-Kalika (37%).

Ageratina adenophora was the most cited IAPS (RFC: 0.51) and it was followed by *Lantana camara (0.17)* and *Ageratum conyzoides*.

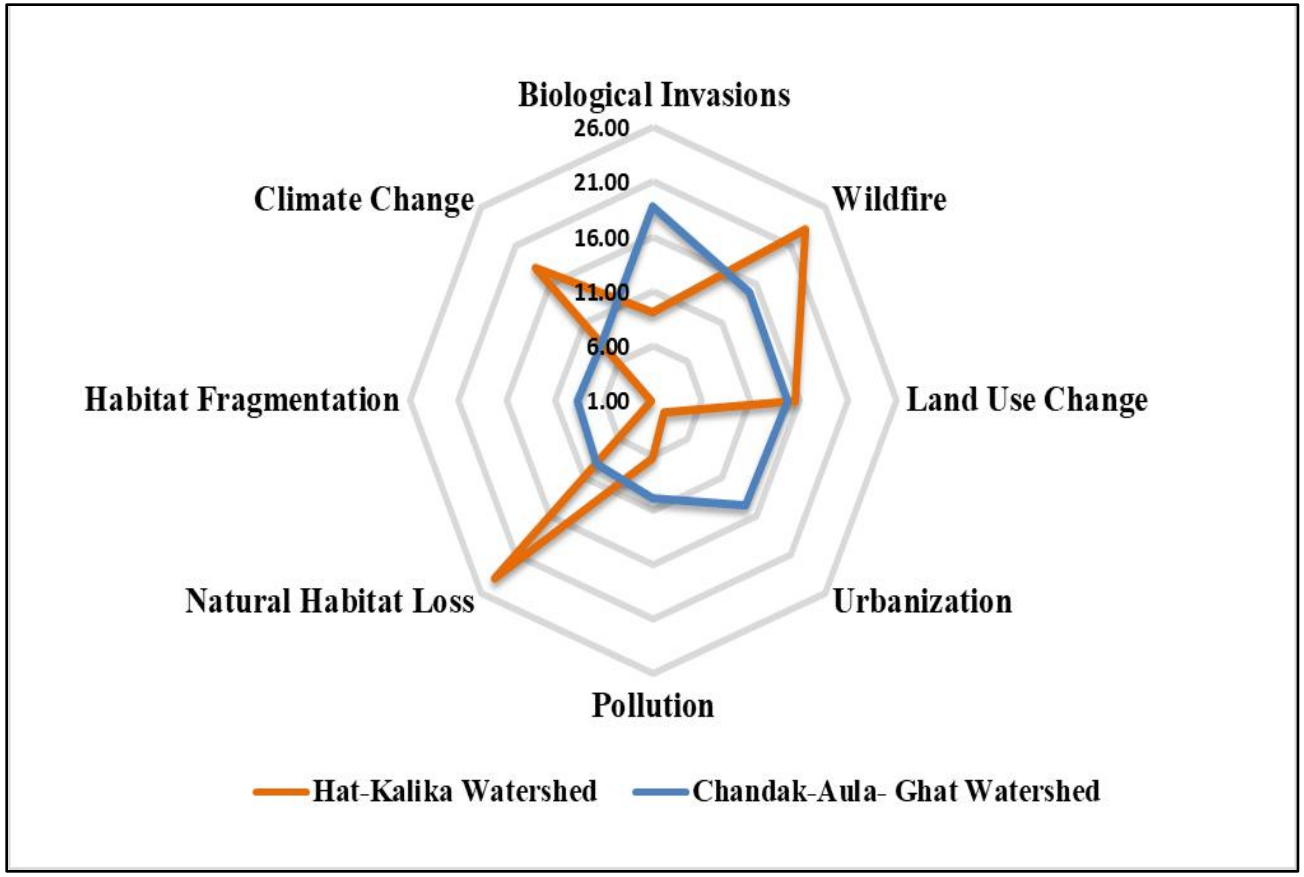
The Knowledge Richness Index (KRI) of the study area was 0.03 and it was more in Chandak-Aunla Ghat (0.05) than Hat-Kalika

Percentage of male, female and Students having knowledge of IAP's in Pithoragarh



99% of respondents were familiar with at least one IAP's.

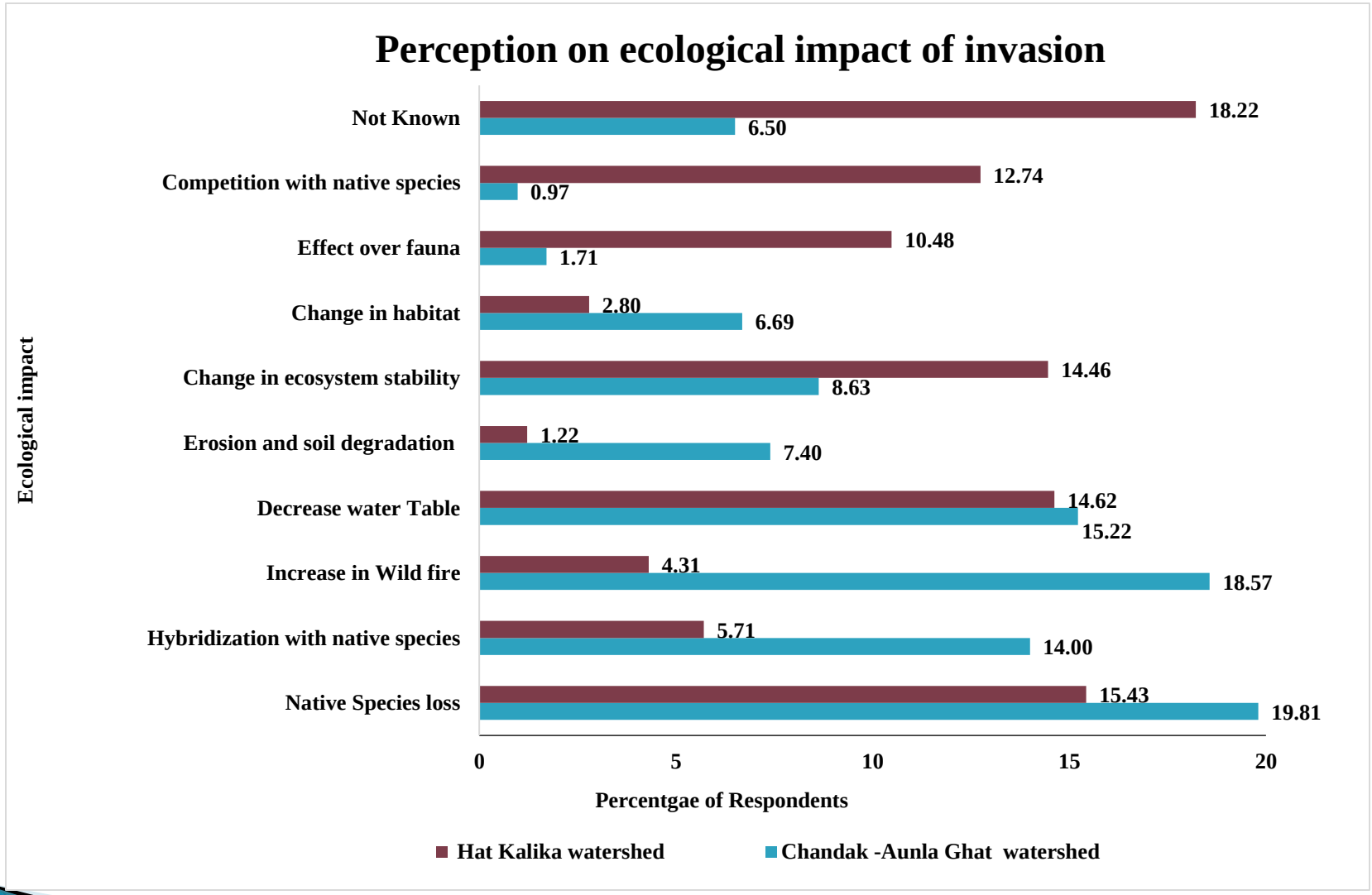
The awareness was observed more in female (39%) than male (27%)



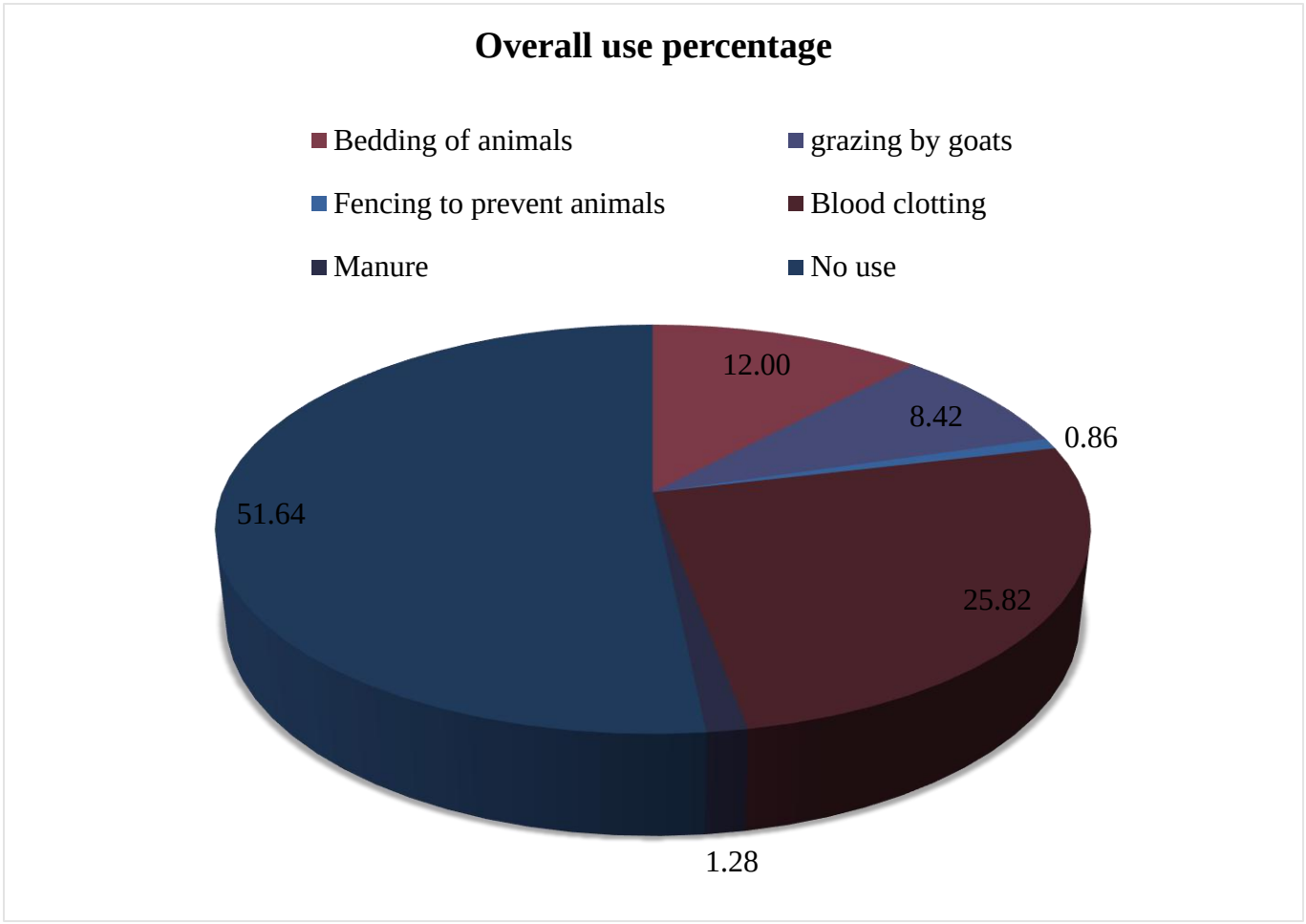
Most respondents perceived IAPS negatively (99%).

In Chandan-Aunla respondents perceived native species loss (19.8%), increase in a wildfire (18.5%), and decrease in the water table (15.2%) as the effect of invasive species.

Whereas, in Hat-Kalika it includes native species loss (15.4%), decrease in the water table (14.6%) and change in ecosystem stability.

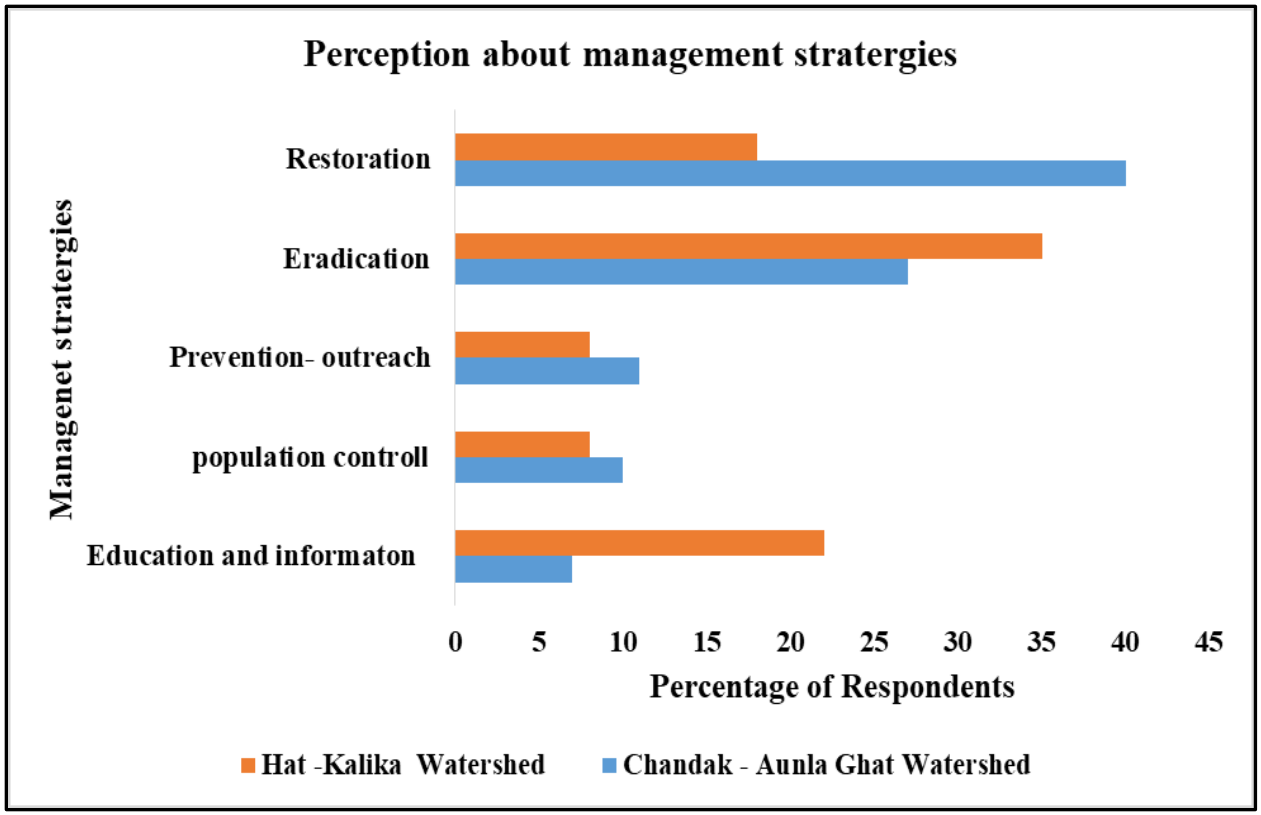


Perception of respondents on ecological impact of invasion



The provision for blood clotting was the most common perceived use (25.8%), followed by the bedding of animals (12%) and grazing.

Managing of IAPS was perceived positively and 70% of the respondents agreed that management of IAP's.



Most respondents in Chandak-Aunla Ghat perceived restoration (40%) and eradication (27%) as a major management strategy for IAPS.

On the contrary, eradication (35%) and education and information (22%) were perceived by the respondent for managing IAPS in Hat-Kalika.

Discussion:

Of the 14 IAPS, *Ageratina adenophora*, *Lantana camara* and *Ageratum conizides* were the most cited IAP's in both the watershed.

Ageratina adenophora had the highest RFC value.

Ageratina adenophora is an aggressive rapidly spreading IAP's, have recently reported at an elevation ranging between 2800 and 3000 m in Uttarakhand.

Respondents in Chandak-Aunla Ghat were more aware of the IAP's than Hat-Kalika. It could be due to the awareness programme regarding IAP's and its impacts, conducted in the Chandak-Aunla Ghat area under KSLCDI.

We found respondents perceived IAPS negatively in both watersheds of Pithoragarh and are responsible for various environmental hazards.

Conclusion:

The results reveals the need of awareness programmes in the study area and they need to know the tentative threats of the IAPS to their ecosystems.

Public participation is to be ensured in eradication and restoration programmes in the study area and the involvement of the students in the activities.


THANK YOU