under this category falls to this variety. The question here is, As long as food culture is conserved, do we need to use PPB to conserve and use these kinds of landraces? Yield improvement and better marketing may add to the value of these cultivars and, consequently, many farmers may increase the area they plant to them.

Anga is grown for medicinal purposes in very poor soils, whereas Bayerni and Jerneli are very high-quality, low-yielding landraces specially grown in small areas for household consumption on festivals and for special guests. These types of rice are difficult to find in the market. The survey also showed that resource-rich farmers of the community conserve such special crop genetic resources. The value of such landraces is well understood but farmers maintain them in small areas

Table 7. Comparative Use-Value of Rice Landraces Grown in Large Areas (> 1.2 ha) by Few Households (< 6 HH) in Begnas Village, Kaski Ecosite, Nepal

Farmer-named cultivars	HH #	Ecosystem	Major use	Use-value and constraints perceived by farmers	Undesired traits perceived by farmers
Sano madhise	6	Tari/irrigated HYP 700-1100m	Subsistence	High yield (3)	Poor straw yield (3)
Gurdi	9	Irrigated HYP 800-1200m	Subsistence	Adapted to low-input conditions (5) Relatively good taste (5) Good milling recovery (4) Good straw value in terms of yield (3)	Poor yield (2)

Source: Baseline survey, 1999.
Note: Figures in parentheses indicate number of respondents in survey. Only top three frequencies of positive and negative traits were considered as perceived value of each variety.
Tari = indigenous classification of land types, upland rainfed rice ecosystem.

for specific domestic uses. Their small population size may lead to genetic drift. Does PPB have the scope to increase their productivity so that useful alleles from the Bayerni, Jerneli, and Anga populations are maintained? If the crop-improvement program is successful in incorporating good quality with yield advancements, will PPB products replace the diversity of other landraces that are not chosen for improvement? Farmers value Anga for its multiple traits and it has been crossed with NR 10291-6-1 for better yield. Landrace enhancements for Beyerni and Jerneli have also been suggested for improving yield.

Landraces grown in small areas by few farmers. In all sites, the majority of farmer-named cultivars fall into this category. In Begnas alone, out of 63 landraces grown, 48 landraces were maintained by only a few farmers in small patches of about 0.5 ha (figure 1). We need to understand why farmers grow so many landraces in small patches, as well as when and where they grow them and how they maintain and use them at the local level (table 9). Except for a few, the majority of landraces are maintained in small areas scattered in fragmented plots. This group of cultivars falls into locally rare materials, which should receive priority for ex situ conservation. Of 48 cultivars, 24 farmer-named cultivars were maintained by virtually a single household and can be defined as endangered. Should these be improved by PPB? Or are they candidates for a genebank before they disappear from the community? Do these varieties have specific genetic value? Or are farmers maintaining them because they do not have any better options? Or are they selected from locally common landrace populations? If so, should they be candidates for PPB?

Table 8. Comparative Use-Value of Rice Landraces Grown in Small Areas (< 0.5 Ha) by Many Households (> 11 HH) in Begnas Village, Kaski Ecosite, Nepal

Farmer-named cultivars	HH #	Ecosystem	Major use	Use-value and constraints perceived by farmers	Undesired traits perceived by farmers
Rato anadi	71	Irrigated; *dhab* HYP 700-900m	Food culture	Good for latte recipe (56) Medicinal value (59) Good for many local recipes such as sirula (35), khatte (17), puwa (16), tote (12), chiura (5)	Poor milling recovery (20) High input requirement (15) Low yield (10)
Seto anadi	54	Irrigated; *dhab* HYP 700-900m	Food culture	Good for sticky latte rice (47) Good for many local recipes such as sirula (42), khatte (22), tote (7), chiura (5), puwa (1)	Coarse grain (6)
Jerneli	16	Rainfed *tari/dhab* 600-900m	High-quality rice for home consumption	Adapted to low-input rainfed conditions (45) Good taste (36) Early maturity (21)	Low yield (3) Poor milling recovery (2) Input demanding (2)
Bayarni	11	*Tari* HYP 700-1000m	Quality aromatic rice for home consumption	Good quality rice: aroma, softness (22) Medicinal value (5) Good for mats (7)	Low yield (6) High input demanding (6)
Anga	9	Unirrigated *tari* LYP 1000-1400m	Medicinal use	Adapted to very poor soil and rainfed plots (9) Medicinal value (5) Good fodder	Poor taste (6) Low yield (3) Red rice (6) Traits similar to wild rice (3)

Source: Baseline survey, 1999.
Note: Figures in parentheses indicate number of respondents in survey. Only top three frequencies of positive and negative traits were considered as perceived value of each variety.
Tari=upland rainfed rice ecosystem.
Dhab= permanent waterlogged ecosystem.

Table 9 illustrates the use value of minor varieties from the Begnas site. For example, Sano gurdi is valued for its moth tolerance in on-farm storage, whereas Biramphool[10] and Ramani are kept for their excellent cooking quality. These varieties are, however, low yielding and special skills are needed for cooking them in the traditional *kasaudi* (a thick, round, nickel pot for slow cooking on the fire). The introduction of rice and pressure cookers has replaced old cooking practices and skills and has also slowly reduced the demand for these varieties.

Naltume is a niche-specific variety adapted to shaded areas. Tunde is concentrated in drought-prone plots. Many Jerneli and Bayerni types are maintained for multiple quality traits despite their low yields. More case studies may be needed for varieties that are conserved without special value. The challenge is to identify the special genetic value of these rare landraces and find ways to assist the continued selection of local landraces that conserves the evolutionary process of landrace diversity. Traditional knowledge about such cultivars is limited, as few farmers maintain them.

In the PPB program, farmers decided to select Biramphool for its high-quality traits, whereas Naulo madishe was selected for its local adaptation to rainfed conditions. Biramphool will be crossed with another modern aromatic rice with better plant stature. Naulo madhise is crossed with IR 36 to incorporate its good yield potential (table 9).

10. The survey showed that two resource-rich farmers conserved this variety in an area of 0.30 ha. This variety is highly valued for its aromatic quality, which is controlled by a single gene.

Table 9. Comparative Use-Value of Rice Landraces Grown in Small Areas (< 0.5 ha) by Few Households (< 6 HH) in Begnas Village, Kaski Ecosite, Nepal

Farmer-named cultivars	HH #	Ecosystem	Perceived use-value by farmers	Perceived negative traits by farmers
1. Lahare gurdi	7	*Tari dhab* 800-1000m	Good taste (8), long straw (8), good milling recovery (4), adapted to cold water	Requires more water (3) Late maturity (2) Nutrient demanding (2)
2. Thulo madhise	4	*Tari* 600-900m	Good straw yield (4), good taste (3), adapted to marginal lands (3), better milling recovery	Late maturity Insect pest problems Sterility
3. Sano gurdi	5	*Tari*/irrigated 700-1000m	Adapted to rainfed conditions, adapted to shaded area, milling recovery, good taste	Low yield
4. Naulo Madhise	3	*Tari*/irrigated 600-900m	Long straw (5), drought-tolerant	High input demanding (2)
5. Kalo gurdi	2	*Tari*/irrigated 900-1400m	Long straw, good taste, adapted to shaded area	Difficult to thresh, prone to false smut, high input demanding
6. Jhauri	2	*Tari*/irrigated 900-1400m	Drought-tolerant, low input requirement, early, medicinal value, good for beaten rice, long straw	Poor taste
7. Ghaiya	3	*Tari* upland 700-1300m	Medicinal value (2), drought-tolerant, suitable for inter-crop with maize, early, good for *puwa*	Low yield (2) Leaf roller problem
8. Tunde	7	*Tari*/irrigated 800-1200m	Drought-tolerant	
9. Rato ghaiya	5	*Tari* upland 700-1300m	Supplement rice need before main rice harvested, good taste, early, good for beaten rice	Bad quality and taste, low straw yield, leaf roller problem
10. Seto gurdi	1	*Tari* upland 800-1200m	Tolerance to moths, good milling recovery	
11. Bicharo ghaiya	4	*Tari* 600-900m	Good for beaten rice, medicinal value, adapted to marginal land	low yielding, less milling recovery, coarse grain (2)
12. Gurdi ghaiya	5	*Tari*/irrigated 900-1400m	Quality straw for mat making, medicinal value	Difficult to thresh, low milling recovery
13. Manamuri	2	*Tari*/irrigated 800-1200m	Better adapted to low-input agriculture, easy to thresh, medicinal value	Low yield
14. Pakhe jerneli	2	*Tari* 800-1200m	Medicinal value (3), good for *latte* (2), *siraula*, *tote;* lodging-tolerant; good taste, aroma; long straw; low input; early	Low milling recovery
15. Gauuriya	1	*Tari* 900-1000m	Good taste, fine grain, high yield, good milling recovery, adapted to sandy soil, long panicle with awns	Late maturity, awned grains
16. Kaude	1	*Tari* 600-900m	Easy to thresh	
17. Naltume	3	*Tari*/shaded area 800-1200m	Good taste (3), good for shaded area (2), early, lodging- and shattering-tolerant, more milling recovery	Low straw yield
18. Dhabe jerneli	3	*Tari* 600-900m	Good taste (4), aroma, good for *latte*, long straw	Poor milling recovery, nutrient demanding

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Table 9. Comparative Use-Value of Rice Landraces Grown in Small Areas (< 0.5 ha) by Few Households (< 6 HH) in Begnas Village, Kaski Ecosite, Nepal (Continued)

Farmer-named cultivars	HH #	Ecosystem	Perceived use-value by farmers	Perceived negative traits by farmers
19. Ramani	5	Irrigated 800-850m	Good quality (11) with aroma, long straw (4), less prone to insect pests	Late, low yield, poor-quality straw
20. Jire ghaiya	2	*Tari* 600-900m	Adapted to upland *tari*	No special traits
21. Kalo jhinuwa	5	Rainfed *tari*/irrigated 800-1000m	Good quality (12), good straw quality (8), aroma (3), good for *khatte*, adapted to water logging, shaded areas	Low yield, late, difficult threshing
22. Kaude anadi	4	*Dhab*/irrigated 700-900m	Medicinal value (3), good for *latte* (2), *siraula*, *tote*, lodging-tolerant	
23. Jhinuwa	2	*Tari*/irrigated 800-1000m	Good quality, medicinal value, good for *puwa*, adapted to shaded area, low input requirement	
24. Thapachini	2	*Tari* 600-1000m	Good for *khatte*, adapted to marginal lands, good for beaten rice	Poor taste
25. Jhayali rato ghaiya	1	*Tari* 600-900m	Yield, supplement need of rice before main crop harvest	Poor taste, high shattering
26. Mala	1		Good for beaten rice, medicinal value, early maturity	Poor taste, high water demanding
27. Kunchali ghaiya	1	*Tari* 600-900m	Adapted to rainfed, early maturity, better milling recovery, good yield	
28. Lame	1	*Dhab*	Adapted to swampy land, good taste, aroma	
29. Kanchhi mansuli	1	Irrigated	Good yield, adapted to shaded area, long straw	
30. Kanajire ghaiya	1	*Tari* 700-1000m	Adapted to rainfed, green straw	Poor taste, prone to rodent damage
31. Katuse ghaiya	1	*Tari* 700-1000m	Adapted to rainfed	Poor taste, prone to rodent damage, shattering, etc.
32. Lahare ghaiya	1	*Tari* 700-1000m	Adapted to rainfed	Prone to water logging
33. Masino ghaiya	1	*Tari* 700-1000m	Fine-grain upland rice with no special quality	Low straw quality and yield
34. Masino jhinuwa	1	*Tari* 700-1000m	Fine grain, long straw, good taste	Poor yield
35. Seto jhinuwa	1	*Tari* 700-1000m	Good quality, good milling recovery, long straw, aroma	Poor straw quality, high input demanding, prone to rodent damage
36. Barmali	1	*Tari* 700-1000m	High yield, long straw	Poor milling recovery, poor eating quality, high input demanding
37. Chobo	1	*Tari* 700-1000m	Good for *puwa*, more production	Nutrient demanding
38. Jhinuwa basmati	1	Rainfed *tari* 800-1000m	Good taste, good milling recovery, long straw, aroma, long fine grain	Late maturity, awns

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Table 9. Comparative Use-Value of Rice Landraces Grown in Small Areas (< 0.5 ha) by Few Households (< 6 HH) in Begnas Village, Kaski Ecosite, Nepal (Continued)

Farmer-named cultivars	HH #	Ecosystem	Perceived use-value by farmers	Perceived negative traits by farmers
39. Juge bayerni	1	Irrigated 900m	Good taste, good milling recovery, long straw, aroma, long grain	Low yield, awns
40. Kalo bayerni	1	*Tari* 700-1000m	Good yield, aroma, good milling recovery, long panicle, black grain green rice	Low yield
41. Kalo tunde jhinuwa	1	*Tari* 900-1100m	Good taste, aroma, medicinal value, long panicle, good milling recovery	Low yield
42. Rate	1	*Tari* HYP 1000-1400m	Good taste, good milling recovery, high grain panicle	Threshing difficulty
43. Pakhe rameni	1	Tari 800-900m	Good taste, aroma, long straw, high tillering	Poor straw quality, low milling recovery
44. Seto bayerni	1	*Tari* 700-1000m	Good taste, good milling recovery, long straw, less shattering	High input demanding, prone to leaf roller attack
45. Bayerni jhinuwa	1	*Dhab* 800-1000m	Good quality, good milling recovery, long straw, aroma	High input demanding
46. Biramphool		*Dhab*/irrigated 700-800m	Good quality rice (6), aroma, long straw	Low yield, difficult to thresh
47. Basmati	5	Rainfed *tari* 800-1000m	Good quality (11), long straw (7), milling recovery (5)	Low yield

Note. Figures in parentheses indicate number of respondents in survey. Only top three frequencies of positive and negative traits were considered as perceived value of each variety.
Dhab=swampy, waterlogged rice ecosystem.
Tari=upland rainfed ecosystem.
Upland=dry-seeded, rainfed upland ecosystem.

Developing options for adding benefits. Two options were used in adding benefits: the first on adding benefits through participatory plant breeding and seed networks and the second on adding benefits through public awareness, better processing, marketing, and policy incentives (Sthapit, Sajise, and Jarvis 2000). The first option is to seek improved quality, disease resistance, high yield, better taste, and other preferred traits through breeding, seed networks, and modified farming systems. The second option includes adding value to crop resources so that the demand for the material or some derived product may be increased. These diverse options will emerge when the community, researchers, and developmental institutions are directly involved to monitor local crop diversity using CBRs and to link with crop-improvement, seed, and market networks for adding benefits on local resources. Table 10 illustrates a few examples of options for adding value.

Setting breeding goals and selecting landrace parents for PPB. Parents can be selected on the basis of either (1) the evaluation of parents or (2) the evaluation of their progeny. Participatory methods help greatly when selection is made on the basis of parental evaluation. The aim is to select parents that are as unrelated as possible, have complementary attributes, and will contribute towards the ideal genotype. In PPB, at least one of the parents should be adapted to the target environment and have traits that farmers like. The best way of identifying such a parent is by understanding the importance of crop diversity or through participatory varietal selection, which allows a wide