

Pelicans and People:

The Two - Tier Village Of Kokkare Bellur,
Karnataka, India



K. Mann and Sara Jolly

Community Based Conservation in South Asia: Case Study No.4

**Kalpavriksh
and**

International Institute of Environment and Development

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Kokkare Bellur, the Two-Tier Village

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About the Study

This case study is part of a regional and global process of understanding and documenting community-based conservation of natural resources, in particular biodiversity. The global project, called Evaluating Eden, is sponsored and coordinated by the International Institute of Environment and Development, London. The South Asia Regional Review of Community Involvement in Conservation, which was part of this global project, was coordinated by a group of individuals associated with the environmental action group Kalpavriksh: Ashish Kothari, Neema Pathak and Farhad Vania.

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The first author is with the NGO Mysore Amateur Naturalists (MAN), which has been working with natural history and wildlife conservation issues in Karnataka. He has, over the past few years, spent most of his time with the villagers of Kokkare Bellur and considers himself more a resident of that village than of Mysore. The second author is an independent film-maker from the United Kingdom. She has made a film on Kokkare Bellur and the work of MAN, and has been involved with its activities for the last few years. They can be contacted at : 227, 3rd Main, 1A Block, Vijaynagar 3rd Stage, Mysore 570017, Karnataka (Tel: 91-821-412612).

About Kalpavriksh

Kalpavriksh (KV) is a 20-year old voluntary group in India, working on environmental education, research, campaigns, and direct action. KV believes that a country can develop meaningfully only if ecological sustainability and social equity are guaranteed. To this end its activities are directed to ensuring conservation of biological diversity, challenging the current destructive path of 'development', helping in the search for alternative forms of livelihoods and development, assisting local people in empowering themselves to manage their surrounds, and reviving a sense of oneness with nature. Over the last few years it has increasingly focused on community based conservation and management of natural resources, and is currently putting together a Directory of Community Conserved Areas in India.

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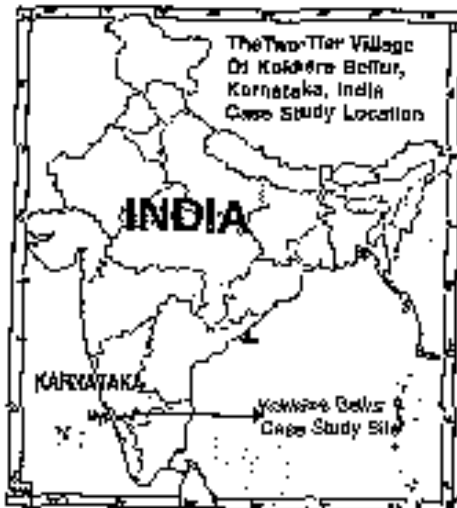
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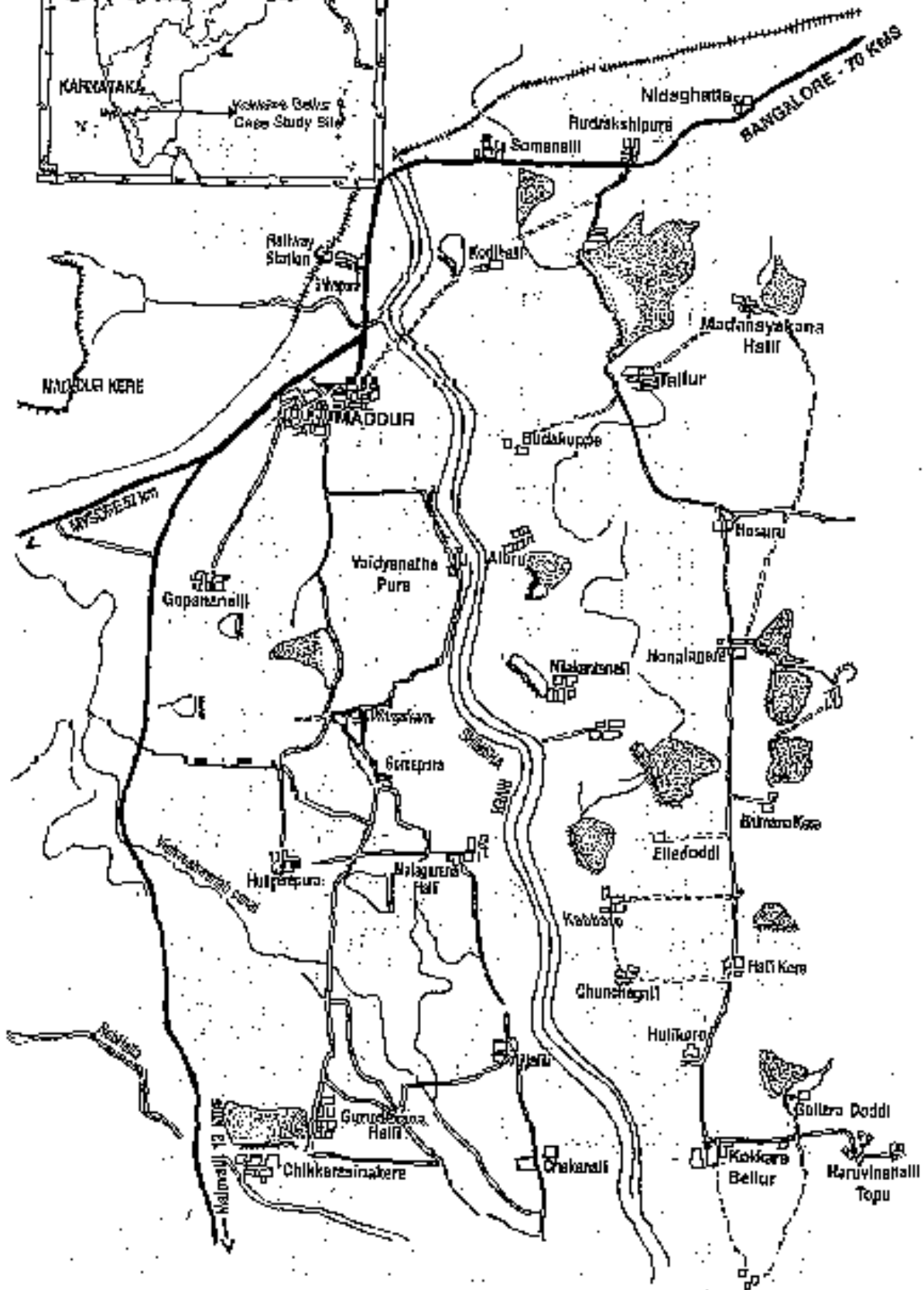
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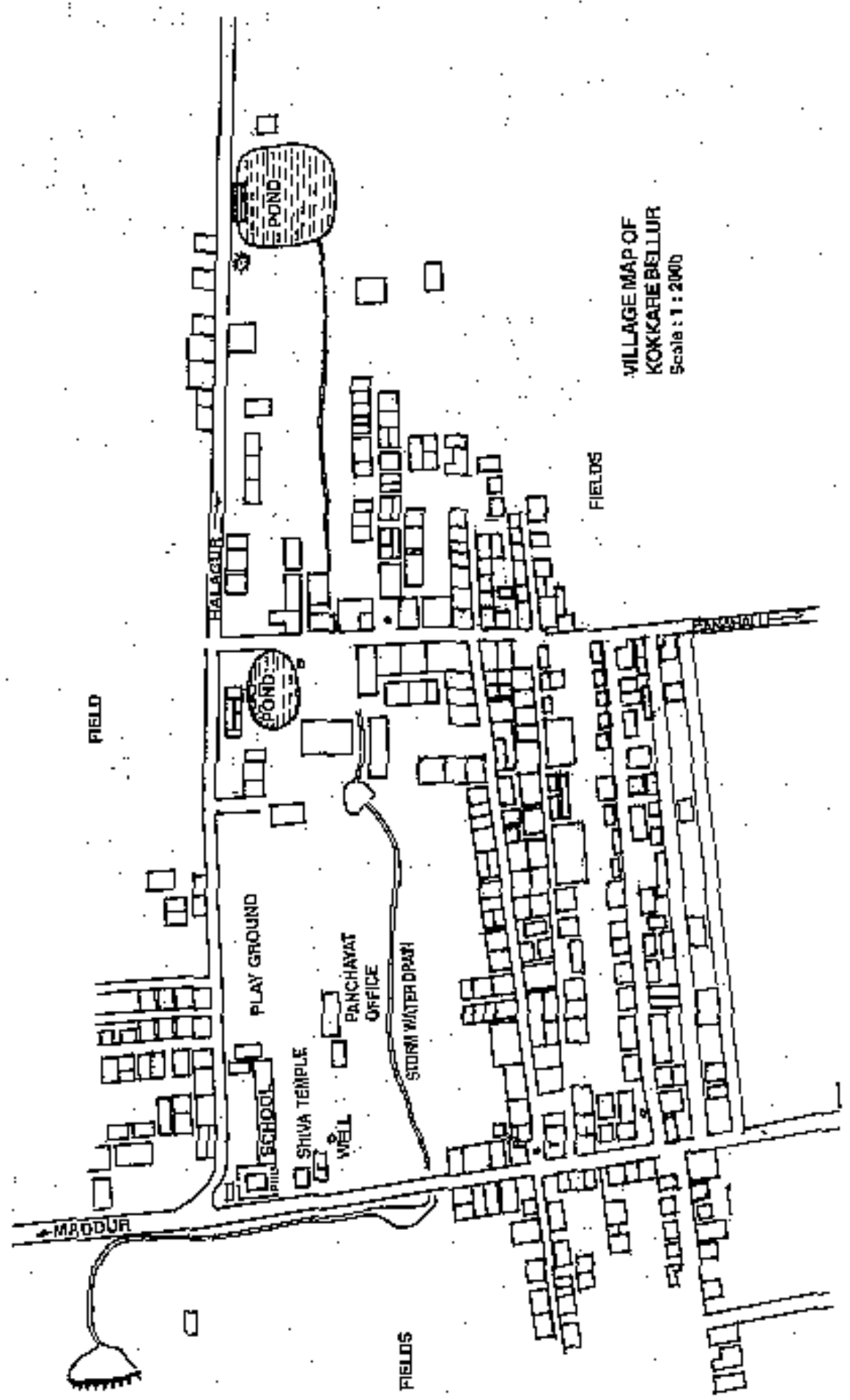
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MADDUR TALUK

Scale: 1:50,000





VILLAGE MAP OF
KOKKARE BELLUR
Scale : 1 : 2000

1. Introduction

Kokkare Bellur is situated $12^{\circ}13'N$ and $77^{\circ}05'E$, about 80 km from Bangalore in Maddur Taluk of Mandya District, Karnataka state, southern India. It is bounded on the south side by the Shimsha, a small perennial river, and lies on the Maddur-Halagur road, 12 km off the Mysore-Bangalore road (see Map No 1).

For six months of the year, Kokkare Bellur is like any other village in south Karnataka. Its houses are built mostly in the traditional style with high platforms, carved wooden pillars and country-tiled roofs. The inhabitants are typically rural, following the ancient rhythms of the agricultural calendar. All is quiet here, until the village undergoes a spectacular transformation. Beginning December right upto June, hundreds of spotbilled pelicans (*Pelecanus philippensis*) and painted storks (*Mycteria leucocephala*) migrate in from the lakes of south Karnataka¹ to establish breeding colonies within the tall trees in the very heart of the village. Over these six months, bird and man co-exist peacefully — it's as if the entire village had acquired a second storey! 'Upstairs' the birds court, mate and rear their young; below, life for the people of the village goes on. Even in the midst of wedding celebrations, when loudspeakers blast music all over the village, the raucous sounds of the birds, the quiver of heavy wings and the clatter of stork bills continue unaffected.

Nobody quite knows why the storks and pelicans, both exclusively fish-eaters, continue to breed in Kokkare Bellur, which is several kilometres away from any substantial waterbody². What is certain,

1 Kokkare Bellur is situated in Mandya District through which the Kaveri, the major river of South India flows. This river and its tributaries, like the Shimsha, keep many of the surrounding large waterbodies perennial.

2 It is, however, within a 100 km radius of numerous irrigation tanks — principally Sule Kere, Malavalli Kere, Koppa Kere, Marchalli Kere, Shetty Kere and Karanj Kere. (see Map 1).

however, is that both species have been coming here to breed for generations; village legend puts it at over hundreds of years. The very name of the place, *kokkare* meaning stork, bears this out. A British naturalist, T.C. Jerdon, writing in 1864, makes the following observation: "*I have visited one Pelicanry in the Carnatic, where the Pelicans have (for ages I was told) built their rude nests, on rather low trees in the midst of a village, and seemed to care little for the close and constant proximity of human beings.*"

This must surely be a reference to the original village of Kokkare Bellur which dates back several hundred years. A hero-stone, dug up in a villager's field in 1974, commemorates the death of an inhabitant of Bellur (presumably someone prominent) after a hunting accident: *Be it well, while Narasimhadeva was ruling the Kingdom on earth, on Thursday, the full moon day of the year Raktakshi, Asagara Gorava of Biragavdana halli, the bumikara (cultivator?), son of Kala - Gowda of Bellur (belonging to Baramadara family) attained heaven while hunting a boar. Irugakara got the hero-stone made*³. The stone is dated July 10, 1264 AD, which goes back to the reign of Hoysala Narasimha III. It now lies neglected in a backyard.

After a plague in 1916⁴, the old village was abandoned and the population resettled a couple of kilometres from the river. Apparently, the birds came too. Possibly the Shimsha, today a fast-flowing, shallow river (due to uncontrolled sand-dredging on the banks), was then deep and slow moving and offered foraging for the pelicans. Today, the birds feed at the abundant lakes and irrigation tanks upto 100 km from the village (see Footnote 2). The long-legged storks:

3 Recorded in *Epigraphia Carnatica*: Vol 3.

4 The plague is commemorated on a roof rafter in one of the oldest houses in the present village. The inhabitants still use this method of dating important events, like births, deaths, etc, by chalking or carving on a wooden beam or rafter.

fish in the shallows, stabbing prey with the points of their long, finely-tapered bills, while the pelicans trawl in the deeper waters using their elastic gular pouches as scooping nets.

This neat division of a shared habitat is also seen in the nesting trees. The pelicans arrive first to settle on the crowns of mature, large-canopied trees. The lighter, more agile, storks come a few weeks later taking up residence on the outer branches. They also colonise smaller trees, too flimsy for the pelicans to use. Jerdon describes the grey (or spotbilled) pelican as, "the most abundant species found in India, occurring in all districts where rivers and tanks abound, and breeding in the country".

It is unfortunate that 130 years on that same pelican is on the endangered species list⁵, and that there are only ten known breeding sites left in India. Kokkare Bellur is one of the most significant of those sites.

5. See Collar *et al*, 1994 and Rose and Scott 1994. See also Asian Wetland Bureau Mid-winter Waterfowl Census, 1993, which estimates not more than 5,000 birds in the whole of South Asia.

2. Description Of The Area

Kokkare Bellur is a typical dryland village in southern India with its cultivated and fallow fields, cactus hedges and trees, both old and young, in the fields and in the village. These include *Tamarindus indica* (*hunase mara*), *Ficus benghalensis* (*alada mara*), *Ficus religiosa* (*arali mara*), *Ficus glomerata* (*athi mara*), *Ficus mysorensis* (*mysore alada mara*), *Acacia nilotica* (*gobbali mara* or *jalli mara*), *Azadirachta indica* (*bevina mara*), *Melia dubia* (*hebbevina mara*), *Delonix alata* (*vai naraini mara* or *chujjali mara*), *Albizia lebeck* (*basari mara* or *bage mara*), *Thespesia populnea* (*bende mara* or *huvarsi mara*), *Albizia amara* (*kadu chujjali mara*), *Samanea saman* (*male mara* or *sanje bage mara*), *Pongamia pinnata* (*hongge mara*), *Madhuca indica* (*hippe mara*), *Syzygium cuminii* (*nerali mara*), *Cocos nucifera* (*thengena mara*), and *Phoenix sylvestris* (*echali mara*).

Despite the proximity of the river Shimsha, only a few farmers can afford the luxury of irrigation pumps. They cultivate paddy, sugarcane and coconut. Most, however, grow only dryland crops with *ragi* (finger millet), *jowar*, *til* (sesame), field beans and groundnut being the main crops in the red loamy soil.

The annual rainfall is about 21 inches over this slightly undulating terrain, with an average altitude of about 850 meters above msl.

3. Socio-Economic Profile

Population: There are approximately 2,000 people with 988 adults on the voter list (these figures are based on the 1991 census and updated from the Panchayat's records of births and deaths).

Social/ethnic profile: Two-thirds of the population belongs to the *vokkaliga* community that are mainly farmers. The other third is made up of harijans, potters (*kumbara-shetty*), fishermen (*ganga matha*) and carpenters (*auchari*). There are four *lingayat* households and one Brahmin family. More than 80 percent of the land is held by the *vokkaligas*. Three percent of the population holds more than 30 acres each. The average land holding is 0.3 acres of wetland and 0.8 acres of dryland per household. The literacy rate is 22 percent.

Major sources of livelihood: Apart from agriculture, the main sources of livelihood are animal husbandry (sheep and goats) and sericulture. Cows and buffaloes together yield only about 187 litres of milk per day. Sand from the river is dredged and transported by those with manpower and a bullock cart to spare (this dredging is totally unregulated). Many of the women and young men work as labour in the sugarcane fields of the surrounding areas for daily wages. People also go to the nearest town for work.

The potters (*kumbara-shetty*) earn their livelihood by making pots; this is their traditional occupation. The small number of villagers belonging to the fishermen's caste (*ganga matha*) have long since given up fishing in favour of agriculture. They often work as labourers in sugarcane fields. Sericulture and animal husbandry supplement agriculture. Livestock management offers the easiest means of livelihood to the landless and unskilled, such as those of the harijan ("lowest" castes) community.

Natural Resources: The main resource available in the habitat is trees. The wood provides fuel and the leaves become fodder for livestock and silkworms.

Another unique and important resource much prized in the village is the guano or bird droppings provided by the colonies of spotbilled pelicans and painted storks nesting in the village trees. These birds are exclusively fish-eating and provide copious quantities of phosphate and nitrogen-rich fertiliser, which the villagers have traditionally used to fertilise their fields. The farmers, just as well, barter their foodgrain to spread guano over their own fields.

In addition to the birds mentioned above, the village is home to a number of other bird species, small mammals and reptiles (see Appendix 2 for checklist of bird species).

Sacred grove (*Devara topu*)

A Shiva temple situated one kilometre outside the village is surrounded by a grove of *mahua* (*Madhuca*) trees which is regarded as sacred and therefore left largely untouched by the villagers. The villagers sometimes graze their goats here; the animals feed mainly on low-growing shrubs as the grass under the thick tree cover is scanty. The grove covers an area of about four acres and contains 68 trees of great age and girth. The community of potters from Kokkare Bellur have the right to gather fallen leaves from the grove which they use to fire their kilns. In return, they supply the temple with clay pots. The potters are also allowed to collect the *Madhuca* seeds. In earlier times they would take the seeds to be pressed, giving a part of the extracted oil to the temple. Nowadays, they sell the seeds to itinerant tradesmen to buy groundnut oil with the money.

Festivities: Apart from the usual South Indian festivals, there are a couple of interesting local festivals, in particular *phara*, the 'Feast of the Village Deity', which unfortunately has not taken place for the last six years owing to feuding between influential families in the

village. According to Thammana Gowda, a 70-year-old local farmer, the focus of this festival is mass cooking and a fair. Every visitor to the festival has to be fed as a point of honour. Funds for the cooking are collected during the year by the Panchayat, at the rate of four rupees per head. Wealthier families donate large sums as a matter of prestige. An attractive feature of the festival is that all the village youth, irrespective of caste, participate in serving food to the visitors. The village deity, in this case a form of Shiva, is taken in procession round the village. At one time, the procession used to be accompanied by the bursting of crackers. There was, in fact, a special instrument used to explode the crackers in a particularly deafening way. The practice was abandoned about 20 years ago, apparently out of respect for the pelicans. No one is able to explain the motivation for this dramatic change, considering the fact that the pelicans appeared to have lived through such 'cracker-full' festivities long before that. On the eve of the festival, a fire is kept burning throughout the night using logs contributed by each family. During the night, as the fire burns, every kind of folk art unfolds — dramas, dancing and singing. In the morning the priest performs fire-walking. This used to be the one occasion in the year when the entire community got together for a special event. The suspension of the festival is a sad loss to the village.

4. History of Land Use Practices

Until a couple of decades ago, there was no pump irrigation and the people depended solely on the harvesting of rain water. Other than actual rainfall, lakes, ponds and open wells provided sources of water. Thus, the land was largely subjected to a dryland pattern of agriculture, ie, a single crop a year. If the rains failed, there was no crop. In the event of a drought, the villagers' main alternative source of income was the trees that grew on the village land. Following the 'green revolution' the villagers still did not introduce chemical inputs into their agriculture. Either the marginal dryland farmers were unable to afford it, or the village was simply too remote to receive government inputs. Instead, the villagers followed their own ways of harvesting and using the guano liberally supplied to them, every year, by the nesting birds. (The birds tend to return to the same trees time and again, although it would appear that a favourite tree is often given a 'rest' for a year. Perhaps to prevent the build-up of ticks and parasites which pose a threat to the health of the breeding colonies.)⁶ Most of the trees grow on private lands and in the farmers' backyards. Even today, the piece of land under a nesting tree is considered an important part of the property. The farmers scoop out deep pits under the trees, fence the area off and allow the bird droppings to accumulate. They then bring in large quantities of silt from nearby lakes and spread it inside the guano pit. This is repeated several times in a nesting season, so that layers of silt and guano alternate in the pit, providing a ready compost and preventing nutrients from being washed away by the rain. The compost heaps are dug into the fields before the early rains of the following year. This traditional method of harvesting the guano has the added benefit of preventing the lakes and ponds around the village from silting up, thereby ensuring the constant recharge of ground water.⁷

6 Interestingly, the pelicans have never used the sacred grove adjacent to the village as a nesting site, though if they had they would have been completely undisturbed.

7 It would be interesting to work out the cost-benefit ratio of retaining vs cutting down these trees (see later discussion on recent trends towards cutting the trees used for nesting). For instance, benefits of retaining the trees would include (i) guano (ii) Forest Department payment per tree (iii) the produce that can be harvested (which does not clash with the nesting, such as tamarind fruits) (iv) the notional benefits of tourism if one were to charge people who come to see the birds. The benefits of cutting the trees would be (i) timber and fuelwood (ii) space for alternative use of the land (eg. for construction or farming). However, such a calculation has not been attempted as part of this study.

5. Community Based Conservation Initiative

The people of Kokkare Bellur have a long reputation for living with the bird colonies breeding in their village in a harmonious, almost symbiotic, way. Though they do not attribute any divine status to the birds, they have always offered them protection, believing that the birds bring them good fortune with regard to the rains and their crops. They are proud of their long association with the birds, nicknamed 'daughters of the village', and compare them to the local girls who may marry into another village but inevitably return home to deliver and nurse their newborn babies. Seeramma, a lively 80-year-old, who runs the village teashop, explained how the villagers took it as a bad omen if the birds failed to arrive and breed in their village. She gave the example of a drought year, when no birds came to the village. Another year, the scarcity of birds coincided with a series of bloodthirsty murders in the village.

A retired schoolmaster has composed a long poem celebrating the birds which he recites on special occasions. The first verse goes like this:

*"In the heartland of India
In the town of Kokkare Bellur
In the winter from East and West
Come flocks of five-coloured storks and pelicans
And perch on the neem, the peepul, the banyan and the habul
And look at the world"*

Many older people in the village reminisce about their childhood when there was a settlement of tribal people called *voddas* who lived on the banks of the Shinsha under an enormous banyan tree on which large colonies of pelicans nested. The tribesmen collected the fish dropped by the birds as they fed their young, dried it in the sun, stored it and ate it throughout the year.

The villagers' protection of the birds now takes the form of benevolent tolerance for these noisy, smelly annual visitors. Once the season starts there is the ceaseless cacophony of young birds clamouring for food, and the all-pervading fishy stench of droppings right there in the villagers' backyards. If the pelicans choose to nest in a tamarind tree, some villagers are even prepared to sacrifice their crops rather than scare off the nesting birds. Village elders actively discourage local children from teasing the birds or stealing their eggs.

About 30 years ago, when a couple of *hakki-pikki* tribals (those who live by hunting birds) came to the village and began climbing trees in search of eggs and chicks, they were shocked to find themselves being arrested by the local Panchayat. Unable to meet the statutory penalty of Rs 100, the tribesmen were tied to a tree in front of the village temple. In another instance in the early '70s, when a Bangladeshi refugee attempted a similar nest-robbing feat, he was caught and locked up for a day in the schoolroom. These two stories were recounted by B. Linge Gowda, a middle-aged farmer and shopkeeper, who remembers the incidents but cannot precisely date them.

In 1976, the Karnataka Forest Department identified this bird village as being of special interest. S.G. Neginhal (DCF Retd) describes⁸ how he was a wildlife officer in Mysore from 1972 onwards, but never knew of the village's existence until 1976. Indeed, apart from Jerdon's reference, the pelicanry seems to have escaped all public mention up until 1976. According to Neginhal, although the Maharajas of Mysore kept extensive records of the wildlife in the surrounding areas, there is no mention of Kokkare Bellur. He adds: "*Sir G.P Sanderson, the father of the world famous Kheddo (elephant catching) whose headquarters was Mysore from 1868 to 1877 in the service of the Mysore Government, does not make any reference to this pelicanry. Mr. Russell, the author of Bullet and Shot in Indian Forest, Plain and Hill, who gives exhaustive details of hunting grounds of the erstwhile Mysore State, and who was the Divisional Forest Officer at Mysore at the end of the last century, has not referred to this pelicanry.* Dr. Salim Ali, who had come

8 In 'Discovery of Kokkare Bellur Pelicanry', *My Forest*, September 1986.

to Mysore, did not come across this pelicanry, although he discovered Ranganittu Bird Sanctuary and got it declared a bird sanctuary in 1940."

Having at last 'discovered' the extraordinary pelican village in 1976, the Forest Department appointed a local man as forest guard or watcher to step up protection here. But, apart from such a promising beginning, the Forest Department has not always been in harmony with the local Panchayat or local people. In 1982, when the Bannerghatta National Park was set up in Bangalore, the Forest Department decided to supply spotbilled pelican chicks for the zoo's collection. Without consulting the Panchayat they tried to carry away a number of chicks but their vehicle was *gheraoed* by the villagers as it tried to leave the village. They were subsequently taken to the Panchayat and the local forest guard was fined and reprimanded for failing to consult the Panchayat about his superiors' orders. Since it was impossible to return the stolen chicks to their respective nests, the Panchayat reluctantly allowed the chicks to be transported to the zoo.

Sadly, such militant defence of the pelicans is becoming a thing of the past. Over the past two decades the growing pressure of population has led to an increased demand for trees as a resource for cooking, animal fodder, fruits for sale, etc. As a result, the villagers have become less hospitable to the storks and pelicans. In 1994, the Mysore Amateur Naturalists (see next chapter) conducted a study on the amount of foliage consumed in the village. It was revealed that two tons of foliage are used, every day, for fuel and fodder. Brick houses have become fashionable, instead of the traditional mud-walled buildings. The firing of bricks takes up large quantities of wood.

Inevitably, as tree lopping and felling increased, there was a gradual decline in the number of birds nesting at Kokkare Bellur.⁹ During the early 1980s, the Forest Department issued a protection order regarding the trees used for nesting, under the Karnataka Tree

9 Thirty years ago, according to the estimates of villagers, there were more than 1,000 pairs of pelicans breeding annually in Kokkare Bellur. Nowadays, the average is about 160 breeding pairs (Subramanya and Manu, 1995). As mentioned later, felling of trees is perhaps not the only factor; others could include hunting in the foraging grounds or wherever they migrate to in the non-breeding season; loss of food in the foraging grounds; pesticide poisoning; and others. These have not been investigated.

Protection Act.¹⁰ The owner of such a tree could fell it only if it was diseased or dead. However, in 1987, a huge banyan tree used for nesting was felled by its owner, a powerful local farmer. No punishment ensued, presumably due to the influential status of the offender and the loopholes in the protection order. The Forest Department then proposed to purchase every tree used for nesting, but the villagers refused to part with their trees. A compromise was eventually hammered out, whereby the villagers were offered an annual compensation for trees used for nesting, thus giving the villagers an incentive not to chop them down. This compensation however is meagre, and, as far as the more valuable trees are concerned, represents only a fraction of the value of the crop, or lopping loss (see Appendix 1: Table of compensation scheme).

A persistent feeling among the villagers is that the compensation scheme is unfairly administered, and that certain applicants are favoured over others. Although there is no evidence to prove this, such mistrust demonstrates a lack of confidence in the Forest Department. In February 1998, a member of the Mysore Amateur Naturalists (MAN) witnessed the cutting down of a tamarind tree which had been used by pelicans and painted storks for a number of years, including the previous season. The tree belonged to a local headman who believed he could bend the law. The cutting was already well under way when the MAN member arrived at the scene and challenged the headman's son, who was supervising the work. When asked whether he had got a fraudulent certificate from the Forest Department (as the tree was obviously perfectly healthy), the son did not deny this, but said in extenuation that they were not cutting the tree for firewood but because they wanted to build a house;

"You musn't have the shadow of a tamarind tree on your house or there will be quarrels indoors."

10 In an article in *Cheetal* in 1980, V.S. Saxena put forward the idea that "to start with, a legal status may be provided to the breeding colony by declaring it a closed area under Section 38 of the Wildlife (Protection) Act, 1972". In fact, the trees in the village are all under private ownership proved by the owners' possession of *patas*. In order to benefit from the protection offered under Sections 38 and 39 of the act, such privately-owned trees would have to be declared of national interest, i.e. as rare species or valuable timber. It seems that the Karnataka Forest Department has never been willing to fight a test case to establish whether a tree used for nesting by an endangered species could be considered 'of national interest'.

It is hard to see whether the compensation scheme has made things better or worse for the preservation of the trees. On the one hand, the extra income to the owners of trees such as *Thespesia* and *Neem* undoubtedly serves as an incentive not to cut them down. The implementation of such a scheme allows the Forest Department a tangible role in the conservation of pelicans and in keeping proper records of trees used for nesting. On the other hand, whenever financial transactions are involved, the system opens itself up to abuse by powerful members of the community who try to get both the compensation and the benefits from their crops. The effectiveness of the scheme depends on the integrity of the local forest guard, who can be manipulated by the powerful and is not trusted by weaker members of the community.

6. Role of NGOs.

Since 1994, a local environmental group, the Mysore Amateur Naturalists (MAN), has been actively involved in the conservation of pelicans and their habitat in Kokkare Bellur. A member of MAN has been practically living full-time in the village. In collaboration with the local people, MAN is seeking to promote the re-establishment of harmony between birds and humans. A grassroots action group, *Hejjarle Balaga* (Pelican Clan), consisting largely of young people from the village, and led by members of MAN, runs a conservation pen for 'orphan' chicks (ie those birds that fall from their nests and would otherwise have perished on the ground). These chicks are raised to the fledgling stage (about four months old); they are then returned to the wild to join their naturally-raised siblings which they do so without any adaptation problems. This 'harvesting' of chicks which would otherwise be lost, goes a long way in counteracting the drastic decline in breeding numbers. It is also a highly effective, hands-on, method of involving even very young members of the community in the conservation effort.

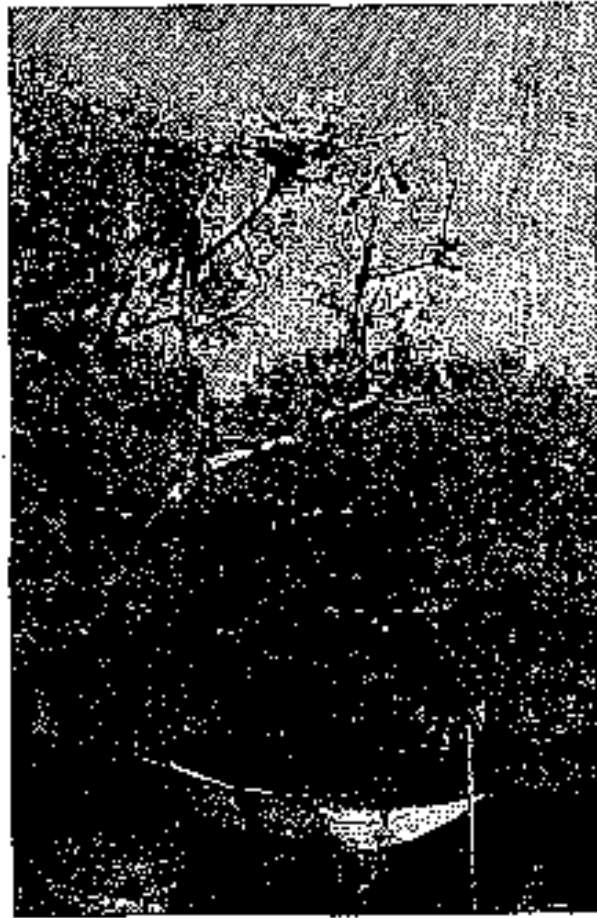
Tree planting (including a nursery to grow saplings), educational activities and a weekly health clinic for the people of Kokkare Bellur have also been introduced. *Hejjarle Balaga's* approach is to combine and link care for the human community with the conservation and protection of the birds. This may help revive the villagers' traditional pride in the birds and reverse the dwindling numbers of the birds at Kokkare Bellur.



Nesting trees amidst the village huts of Kokkare Bellur



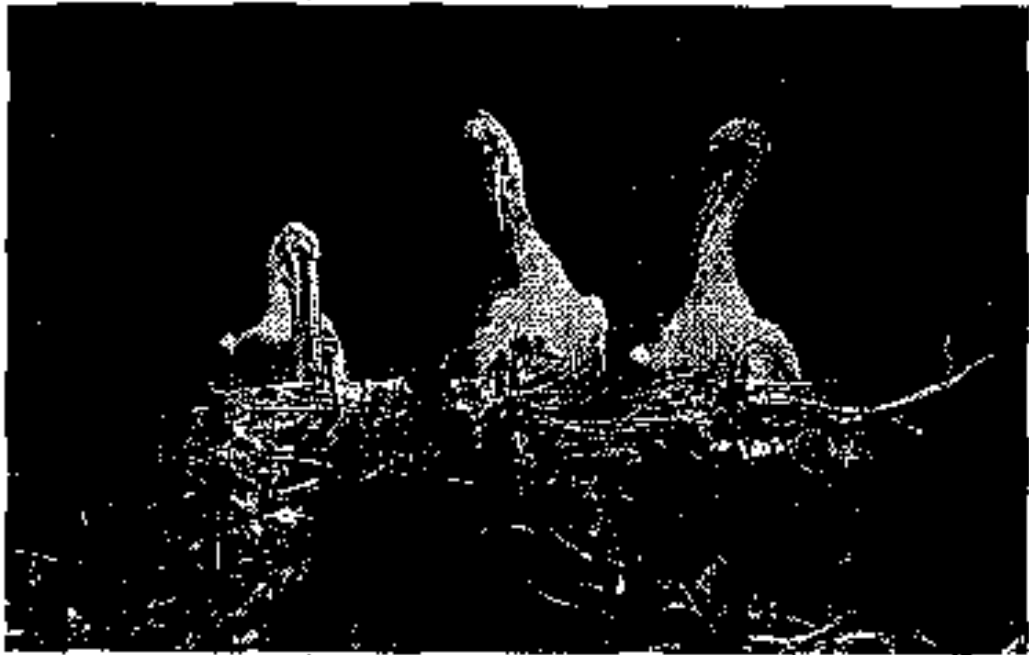
A nesting tree cut by an influential villager: signs of cultural breakdown



Impromptu 'hammocks', made by Mysore Amateur Naturalists,
to save falling chicks



Pelican Clan member, a village youth, inspects a fallen pelican chick



Spotbilled pelicans on a nest in the village: preening and feeding nonchalantly



Two rescued pelicans in enclosure made by the Pelican Clan



Painted stork: one of the village's several hundred guests



Members of MAN, Pelican Clan, and Kalpavriksh discuss the case study at Kokkare Bellur.

In the 1998 season, *Hejjarle Balaga* successfully intervened to protect a pelican colony nesting in a tamarind tree belonging to Thammiah Gowda. A delegation from the action group went to ask Gowda to lease his tree to them for the season, instead of harvesting his crop and disturbing the birds. At first, Gowda tried to drive a hard-bargain, asking for Rs 5,000. Finally, he was persuaded to accept Rs 1,500, which was all the group could afford. Apparently, sheer moral pressure from the group was what influenced Gowda to accept what was offered. He thereby stood to gain not only in terms of approval for his good act but also a reasonable sum of money which included the official compensation.

7. Significant Threats

The building of a two-crore rupee (20 million) bridge over the Shimsha river is almost completed. This will be followed by road widening to help cope with the increased traffic through the village. The new bridge will provide a shortcut, saving 25 km on the journey to Kala Muddamma Doddi, a town with important business and educational facilities and a sugarcane factory. The road widening will involve the loss of eight trees, five of which are mature tamarind trees used for nesting.

The most recent development is the proposed plan by the Tourism Department to set up a holiday resort close to Kokkare Bellur. As far as is known, there has been no market research to assess the viability, indeed the desirability, of such a place. It would seem to be an attempt by local politicians to bag a lucrative building contract. If this plan comes to pass the consequences for the villagers and the birds may well be imagined — sudden exposure to commercialisation and urban culture, and an immense volume of visitors whose interests are not likely to include ornithology.

It is not only the breeding site at Kokkare Bellur which is fragile. The lakes and tanks where the pelicans forage are also undergoing constant, if gradual, changes. These are undoubtedly modifying the habitat and possibly contributing to the decline in pelican numbers. The lakes are being increasingly fed with agricultural waste water, sewage and industrial effluents. The excessive use of chemical fertilisers increases the level of nitrogenous nutrients which, in turn, causes the explosive growth of reeds and aquatic weeds. Large areas of the lakes and tanks become eutrophied and turn into marshes, reducing the expanse of open water where the pelicans can fish. Pelicans are at the top of the aquatic food chain and are therefore extremely susceptible to pesticide loading. In Suli Kere, the tank

8 Constraints and Opportunities

Kokkare Bellur is an unusual site. Although it is a *de facto* sanctuary for the endangered spotbilled pelican, it has no official recognition as such. The Karnataka Forest Department has jurisdiction over the birds and the trees, but there is a split between the territorial division (trees) and the wildlife division (birds and numbered trees used by the birds for nesting). The wildlife division does not have easy access to tree guards and saplings. And, as indicated above, the Forest Department has not won the confidence or the goodwill of the villagers.

So far, MAN and *Hejjarle Balaga* have also not been able to establish a good rapport with the Forest Department. Since officials change their posts every two years, it has been difficult to build up a sustained relationship. At times, there have even been sharp differences of opinion between the Forest Department and MAN/*Hejjarle Balaga*. For example, in early 1997, the Forest Department announced plans to build a viewing tower for visitors to watch the birds, at a cost of two lakh rupees, a sum which needed to be spent before the end of the 1996-97 financial year. *Hejjarle Balaga* was completely opposed to this lavish project and asked for the money to be spent on planting more trees and providing tree guards. The trees would benefit the villagers as well as the pelicans, providing an extra source of fodder in drought years. On a visit to the village on February 16, 1997, the Assistant Conservator of Forests, annoyed at the resistance to his plans, made offensive remarks about the motives for MAN's involvement in the village. The youth from *Hejjarle Balaga* had to be dissuaded from overturning his Maruti Gypsy. The viewing tower project was subsequently dropped, but no money was made available for the tree project either.

nearest to Kokkare Bellur, pelicans find easy pickings in the dead fish which the fishermen throw back from their catches. These are fish which have succumbed to pesticide poisoning or disease. Studies on the brown pelican in the USA have implicated pesticides in lower fertility rates and eggshell thinning.¹¹

Traditional fishing communities are being displaced by highly organised commercial enterprises which are seeding the lakes with exotic fish species that are much less bony than their indigenous counterparts. This too has implications in the formation of eggshells. Poaching poses yet another danger as some communities like eating pelican flesh. Although the hunting of pelicans is illegal under the Wild Life (Protection) Act, Mysore Amateur Naturalists have documented a case which occurred in January 1997 when they witnessed off-duty police officers using pelicans for target practice at Yeligur lake, 30 km from Mysore.

¹¹ Dr S. Subramanya of the University of Agricultural Sciences, Bangalore, is collecting eggshells from Kokkare Bellur and hoping to compare their thickness with museum samples collected by ornithologists like Jerdon in the 19th century.

9. Lessons Learnt

The case study brings to light the following major issues:

1. Changes have occurred in the villagers' lifestyles and attitudes, due especially to commercialisation and modernisation. For example, increases in the price of tamarind (making full harvesting of trees on which the birds nest much more lucrative), the transformation of houses into brick structures (requiring wood fuel to fire the brick kilns), the increasing size of weddings (attracting crows, which have become a menace to pelican/stork chicks), the availability of urea replacing the silt-guano mix and others.
2. Linked to the above, there seems to be an increasing need for money as the barter economy declines and markets become dominant; this leads to the temptation to cut trees, etc.
3. Conservation in a micro-site such as this village, cannot be achieved unless the greater landscape in which it is placed is also ecologically conscious. For instance, the impact of land/water use changes, around the village, on bird populations and their health is probably significant. In particular, the seeding of lakes with exotics and their consequent greater commercial exploitation, the use of pesticides, and other recent trends are worrying.
4. Additional threats to the birds include the rise in human populations (more need for fuel, land fragmentation, etc), and of livestock (goats need more fodder, so more lopping of trees).
5. There appears to be rising unemployment in the village, changing economic aspirations of the younger generation as against their elders, and the lack of innovative income-generation schemes which could absorb these youth. In such a situation, the idea of conservation becomes somewhat difficult, especially when it is coupled with a

serious erosion in cultural/spiritual values that may, in the past, have encompassed a conservation ethos.

6. *Local inequities are significant factors as they allow powerful landlords to get away with tree cutting and other violations, even as many other villagers are critical of such acts.*

7. *The larger political context too has an impact. For instance, now that a four-village Panchayat is in place, there may have been an erosion of traditional leadership in this village, and greater dominance in decision-making by 'outsiders' who are unmindful of the peculiar 'two-tier' nature of Kokkare Bellur.*

8. *There is a lack of institutional structures to take up grievances or help resolve disputes. For example, the banyan tree-felling incident was not taken to a Gram Sabha or Panchayat meeting.*

In the context of the above factors, it would seem more effective to approach conservation through 'lateral' means, such as winning trust through a health clinic, as has been done by MAN.

A catalyst could play a critical role, in this case a dedicated worker from an 'outside' NGO who has chosen to more or less take up residence in the village and has, through sheer hard work and patience, won the trust of many of the villagers.

The formation of *Hejjarte Balaga* has undoubtedly focused the villagers' attention on the situation of the pelicans, and sensitised them to issues such as the cutting down of trees. However, not surprisingly, the villagers are practical people, and when there is a conflict of interest they cannot be expected to put the pelicans first. So it is that even a leading member of *Hejjarte Balaga*, who happens to be a building contractor, is actively involved in plans for the holiday resort near Kokkare Bellur! On the other hand, thanks to some modest funding, MAN has been able to pay a small monthly allowance to two young men in the village, both recent graduates, who help run the conservation pen and take on the responsibility of ensuring that fish is regularly supplied. They are now able to both help out on

their family farms and earn a little extra, and so have an incentive to remain in the village rather than seek work in town. MAN believes that it may be possible to develop further ways of linking village prosperity to the pelicans, perhaps by running a small teashop and information centre which could also sell T-shirts and other small souvenirs. Some members of *Hejjarle Balaga* already act as guides to visitors, conducting them around the nesting trees and distributing information leaflets, prepared by MAN, on the pelicans. Perhaps visitors could be charged an entrance fee which could be used as remuneration to the guides. *Hejjarle Balaga* also has plans to reinstate its own version of the *phara* festival described earlier. In this new version what will be celebrated is not the village deity but the presence of the pelicans in the heart of the community. This combined cultural-economic approach will perhaps offer a way to restore the time-honoured 'symbiosis' between the two sets of inhabitants at Kokkare Bellur.

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Appendix 1

Forest Department Compensation Scheme for trees used for nesting

<u>TREE SPECIES</u>	<u>COMPENSATION OFFERED</u>	<u>ACTUAL VALUE</u>
<i>Tamarindus indica</i>	Rs. 600 - 700	Rs 2,000-3,000 (fruits)
<i>Ficus benghalensis</i>	Rs. 80 - 300	Rs 500-800 (lopped branches for fodder)
<i>Ficus religiosa</i>	Rs. 80 - 300	Rs 500 - 800 (fodder)
<i>Thespesia populnea</i>	Rs. 60 - 100	Rs 200 (fodder)
<i>Acacia nilotica</i>	Rs. 100	Rs 100 (fodder)
<i>Delonix regia</i>	Rs. 60	Rs 100 (fodder)
<i>Azadirachta indica</i>	Rs. 60	Rs 100 (fodder)

Appendix 2

CHECKLIST OF BIRDS AT KOKKARE BELLUR

(With status; serial numbers as in *Handbook of the Birds of the Indian Subcontinent* by Salim Ali and S. Dillon Ripley (in brackets); and local names in bold)

1. Little Grebe or Dabchick. (**Gulamulaka**) VC/r/B¹²(5)
(*Podiceps ruficollis*)
2. Spotbilled or Grey Pelican (**Hejjarle**) VC/V/B(21) (*Pelecanus philippensis*)
3. Little Cormorant (**Neeru Kage**) C/r/B(28) (*Phalacrocorax niger*)
4. Grey Heron (**Budu Baka** or **Kari Krouncha**) C/r(35) (*Ardea cinerea*)
5. Purple Heron (**Nerle Baka** or **Nerle Krouncha**) C/r/B(37)
(*Ardea purpurea*)
6. Indian Pond Heron or Paddy Bird (**Gadde gumma**) VC/r/B(42)
(*Ardeola grayii*)
7. Cattle Egret (**Bellakki**) VC/r(44) (*Bubulcus ibis*)
8. Large Egret (**Dodda Bellaki**) C/r(46) (*Ardea alba*)
9. Smaller or Median Egret Uc(47) (*Egretta intermedia*)
10. Little Egret (**Chikka Bellaki** or **Narayani Hakki**) C/r/B(49)
(*Egretta garzetta*)
11. Night Heron (**Ratri Baka**) C/r(52) (*Nycticorax nycticorax*)
12. Painted Stork (**Banada Kokkare**) VC/V/B (60) (*Mycteria leucocephala*)
13. Openbill Stork (**Kavadu Kokkina Kokkare**) C/V(61)
(*Anastmus oscitans*)

12 VC = Very Common; C = Common; R = Rare; Uc = Uncommon
r = Resident; B = Breeding; V = Vagrant; W = Wintering

14. Whiteneked Stork (**Kari Kokkare**) C/V(62) (*Ciconia episcopus*)
15. White Ibis (**Busa Hakki**) VC/V(69) (*Threskiornis aethiopica*)
16. Black Ibis (**Kammara Kage**) VC/r/B(70) (*Pseudibis papillosa*)
17. Glossy Ibis R/V(71) (*Plegadis facinellus*)
18. Spotbill Duck VC/r/B(97) (*Anas poecilorhyncha*)
19. Gargany or Blawinged Teal C/W(104) (*Anas querquedula*)
20. Cotton Teal (**Sarale Hakki**) C/V(114) (*Nettapus coromandelianus*)
21. Blackwinged Kite C/r/B(124) (*Elanus caeruleus*)
22. Pariah Kite (**Haddu**) VC/r/B(133) (*Milvus migrans*)
23. Brahminy Kite (**Garudana Hakki**) VC/r/B(135) (*Haliastur indus*)
24. Shikara C/r/B(138) (*Accipiter badius*)
25. Sparrowhawk (**Bijju**) C/r/B(147) (*Accipiter nisus*)
26. Indian Whitebacked Vulture (**Rana Haddu**) Uc/V(185) (*Gyps benghalensis*)
27. Egyptian Vulture (**Jalagara Haddu**) Uc/V(186) (*Neophron percnopterus*)
28. Marsh Harrier C/W(193) (*Circus aeruginosus*)
29. Grey Partridge (**Goujala Hakki**) C/r/B(246) (*Francolinus pondicerianus*)
30. Common or Grey Quail C/r/B(250) (*Coturnix coturnix*)
31. Yellowlegged Button Quail (**Mani Goujala**) C/r/B(314) (*Turnix tanki*)
32. Whitebreasted Waterhen (**Beli Yeda Neeru Koli**) C/r/B(343) (*Amaurornis phoenicurus*)
33. Indian Moorhen (**Kari Neeru Koli**) C/r/B(347) (*Gallinula chloropus*)
34. Purple Moorhen (**Keenerle Neeru Koli**) C/V(349) (*Porphyrio porphyrio*)
35. Coot (**Namada Koli**) C/V(350) (*Fulica atra*)
36. Redwattled Lapwing (**Tittiba**) C/r/B(366) (*Vanellus indicus*)

37. Yellow wattled Lapwing (**Haladi Tittiba**) C/r/B(370) (*Vanellus malabaricus*)
38. Marsh Sandpiper (**Jouga Maralupepe**) C/W(395) (*Tringa stagnatilis*)
39. Greenshank UC/W(396) (*Tringa nebularia*)
40. Green Sandpiper (**Hasiru Maralupepe**) C/W(397) (*Tringa ochropus*)
41. Wood or Spotted Sandpiper (**Chikki Maralupepe**) C/W(398) (*Tringa glareola*)
42. Common Sandpiper (**Maralupepe**) C/W(401) (*Tringa hypoleucos*)
43. Pintail Snipe (**Esnapu**) C/W(406) (*Gallinago stenura*)
44. Painted Snipe (**Esnapu**) C/W(429) (*Roustratula benghalensis*)
45. Blackwinged Stilt (**Stiltu**) C/W(430) (*Himantopus himantopus*)
46. Whiskered Tern C/W(458) (*Chilodnias hybrida*)
47. River Tern C/W(463) (*Sterna aurantia*)
48. Blackbellied Tern UC/W(470) (*Sterna acuticauda*)
49. Blue Rock Pigeon (**Paravala**) C/V(516) (*Columba livia*)
50. Indian Ring Dove /Collared Turtle Dove (**Chikka Paravala**) C/r(534) (*Streptopelia decaocto*)
51. Spotted Dove (**Kapotha** or **Manisure Hakki**) C/r/B(537) (*Streptopelia chinensis*)
52. Roseringed Parakcet (**Gili**) C/r/B(550) (*Psittacula krameri*)
53. Pied Crested Cuckoo (**Juttina Kogile**) UC/V(571) (*Clamator jacobinus*)
54. Indian Cuckoo UC/V(576) (*Cuculus micropterus*)
55. Indian Koel (**Kogile**) C/r/B(590) (*Eudynamis scolopacea*)
56. Crow Pheasant or Coucal (**Kembutha** or **Sambar Kage**) VC/r/B(600) (*Centropus sinensis*)
57. Barn Owl (**Beli Gube**) C/r/B(606) (*Tyto alba*)
58. Collared Scops Owl (**Gube**) C/r/B(623) (*Otus bakkamoenu*)
59. Southern Spotted Owllet (**Halakki**) C/r/B(652) (*Athene brama*)

60. Great Indian Horned Owl (**Dodda Gube**) C/r/B(627)
(*Bubo bubo*)
61. Indian Little Nightjar R/r(680) (*Caprimulgus asiaticus*)
62. House Swift (**Banadi Hakki**) C/V(703) (*Apus affinus*)
63. Palm Swift UC/V(707) (*Cypsiurus parvus*)
64. Pied Kingfisher (**Beli Minchholli**) C/r/B(719) (*Ceryle rudis*)
65. Small Blue Kingfisher (**Minchholli**) C/r/B(722) (*Alcedo atthis*)
66. Whitebreasted Kingfisher (**Beli Yede Minchholli**) C/r/B(735)
(*Halcyon smyrnensis*)
67. Bluetailed Bee-Eater (**Nele Balada Nonahiduka**) R/W(748)
(*Merops philippinus*)
68. Small Green Bee-Eater (**Nonahiduka**) C/r(750) (*Merops orientalis*)
69. Indian Roller (**Navarangi Hakki**) C/r/B(755) (*Coracias benghalensis*)
70. Hoopoe (**Chandramukata**) VC/r/B(763) (*Upupa epops*)
71. Grey Hornbill (**Setagina Hakki**) C/r/B(767) (*Tockus birostris*)
72. Large Green Barbet R/V(782) (*Megalaima zeylanica*)
73. Small Green Barbet (**Chambu Kutiga**) VC/r/B(785)
(*Megalaima viridis*)
74. Crimsonbreasted Barbet or Coppersmith VC/r/B(792)
(*Megalaima haemacephala*)
75. Lesser Goldenbacked Woodpecker (**Mara Kutka**) C/r/B(819)
(*Dinopium benghalense*)
76. Blackbacked Woodpecker (**Mara Kutka**) C/r/B(858)
(*Chrysocolaptes festivus*)
77. Singing Bush Lark (**Nela Gubbi**) C/V(872) (*Mirafra javanica*)
78. Redwinged Bush Lark C/V(877) (*Mirafra erythroptera*)
79. Ashycrowned Finch Lark C/B(878) (*Eremopterix grisea*)
80. Rufoustailed Finch Lark C/V(882) (*Ammomanes phoenicurus*)
81. Crested Lark UC/V(899) (*Galerida cristata*)
82. Common Swallow C/W(916) (*Hirundo rustica*)

83. Wiretailed Swallow C/W(921) (*Hirundo smithi*)
84. Redrumped Swallow R/W(923) (*Hirundo daurica*)
85. Grey Shrike (**Budu Kalinga**) R/V(933) (*Lanius excubitor*)
86. Rufousbacked Shrike (**Kalinga**) C/V/B(946) (*Lanius schach*)
87. Brown Shrike C/V(949) (*Lanius cristatus*)
88. Golden Oriole C/V(953) (*Oriolus oriolus*)
89. Black Drongo (**Kajana**) C/r/B(963) (*Dicrurus adsimilis*)
90. Grey or Ashy Drongo (**Budu Kajana**) C/r (965) (*Dicrurus leucophaeus*)
91. Whitebellied Drongo R/V(967) (*Dicrurus caerulescens*)
92. Brahminy Myna (**Karithale Myna**) C/W(994) (*Sturnus pagodarum*)
93. Rosy Pastor C/W(996) (*Sturnus roseus*)
94. Common Myna (**Goruna Hakki**) C/r/B(1006) (*Acridotheres tristis*)
95. Jungle Myna (**Mise Myna**) C/r/B(1010) (*Acridotheres fuscus*)
96. House Crow (**Kage**) VC/r/B(1049) (*Corvus splendens*)
97. Jungle Crow (**Jangli Kage or Kadu Kage**) VC/r/B(1057) (*Corvus macrorhynchos*)
98. Wood Shrike R/V(1070) (*Tephrodornis pondicerianus*)
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102. Goldmantled Chloropsis C/V(1108) (*Chloropsis cochinchinensis*)
103. Redwhiskered Bulbul (**Pikalara**) C/r/B(1120) (*Pycnonotus jocosus*)
104. Redvented Bulbul (**Kotaga**) C/r/B(1128) (*Pycnonotus cafer*)
105. Whiteheaded Babbler (**Taragde Hakki**) C/r/B(1267) (*Turdoides affinis*)

106. Tickell's Redbreasted Blue Flycatcher UC/r/B(1442) (*Muscicapa tickelliae*)
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108. Paradise Flycatcher UC/r/B(1461) (*Terpsiphone paradisi*)
109. Streaked Fantail Warbler (**Besanage hafada Hakki**) C/r/B(1498) (*Cisticola juncidis*)
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111. Tailor Bird (**Darje Hakki**) C/r/B(1535) (*Orthotomus sutorius*)
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113. Chiffchaff C/W(1574) (*Phylloscopus collybita*)
114. Green Leaf Warbler UC/W(1605) (*Phylloscopus trochiloides*)
115. Magpie Robin C/r/B(1661) (*Copsychus saularis*)
116. Pied Bushchat (**Bele chitiga**) C/r/B(1700) (*Saxicola caprata*)
117. Indian Robin C/r/B(1720) (*Saxicoloides fulicata*)
118. Indian Grey Tit (**Mudda gubbi**) C/V(1794) (*Parus Major*)
119. Indian Tree Pipit UC/V(1852) (*Anthus Hodgsoni*)
120. Indian Paddyfield Pipit C/V(1859) (*Anthus novaeseelandiae*)
121. Tawny Pipit C/W(1861) (*Anthus campestris*)
122. Forest Wagtail R/W(1874) (*Motacilla indica*)
123. Greyheaded Yellow Wagtail (**Haldi Kundikasa**) C/W(1875) (*Motacilla flava*)
124. Blueheaded Yellow Wagtail R/W(1876) (*Motacilla flava*)
125. Blackheaded Yellow Wagtail UC/W(1878) (*Motacilla flava*)
126. Grey Wagtail (**Buda Kundikusa**) C/W(1884) (*Motacilla cinerea*)
127. White Wagtail (**Bele Kundikasa**) UC/W(1885) (*Motacilla alba*)
128. Large Pied Wagtail C/r/W(1891) (*Motacilla maderaspatensis*)
129. Thickbilled Flowerpecker (**Huvu Kudaka**) C/V(1892) (*Dicaeum agile*)

130. Tickell's Flowerpecker (**Huyu Kudaka**) C/r/B(1899) (*Dicaeum erythrorhynchos*)
131. Purple-rumped Sunbird (**Surahakki**) C/r/B(1907) (*Nectarinia zeylonica*)
132. Purple Sunbird (**Aparanji Huvinahakki**) C/r/B(1917) (*Nectarina asiatica*)
133. White-eye R/V(1933) (*Zosterops palpebrosa*)
134. House Sparrow (**Gubbi**) C/r/B(1938) (*Passer domesticus*)
135. Baya or Weaver Bird (**Gijaga**) C/r/B(1957) (*Ploceus philippinus*)
136. Streaked Weaver Bird (**Battada Gijaga**) C/r/B(1962) (*Ploceus manyur*)
137. Red Munia or Avadavat (**Kempu Gubbi**) R/V(1964) (*Estrilda amandava*)
138. Whitethroated Munia (**Tene Gubbi**) C/r/B(1966) (*Lonchura malabarica*)
139. Whitebacked Munia C/r/B(1968) (*Lonchura striata*)
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Notes

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A Series of Case Studies and Theme Papers

Across the world, a powerful new trend in the conservation and management of natural resources is where local communities are empowered to manage their surrounds. This could be a self-initiated process by the community, or triggered by an NGO, government agency, or donor. It could be exclusively handled by the community, or be some form of collaborative or joint management with outside a conservation, livelihood security, water harvesting, or others. But whatever the origin and nature and motivation behind the initiative, the trend towards community based conservation and management is clear.

South Asia is fast emerging as a pioneer in this new trend. Communities are digging deep into their past and reviving powerful traditions of communal decision-making, as also adjusting to new circumstances and challenges. NGOs and government agencies and donors are learning that working "with" rather than "against" or even "for" communities, is a much surer way of achieving goals. At hundreds of sites across the region, community based strategies are reviving and protecting natural ecosystems, reviving threatened wildlife populations, and achieving higher levels of livelihood security. But there are also challenges such as gender and class/caste forces undermining conservation. On the positive side, each of the region's countries is revamping its planning and policy framework to facilitate community based conservation (CBC).

This series of case studies and theme papers documents a number of CBC sites or themes in the region. This attempt follows a broad overview of the status of CBC in South Asia, which has been published in early 2000 by Kalpavriksh and IIED as *Where Communities Care: Community Based Conservation of Wildlife and Ecosystem in South Asia* (see p.32 for details). Each study describes the initiative in detail, and analyses it to learn lessons for the future and for other sites in the region. The case studies and the theme papers are

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Anuradha, R.V. *Sharing the Benefits of Biodiversity: The Kani-TBGRI Deal in Kerala, India.* pp. 45, Rs. 40/-

Ekaratne, S.U.K., Jinendradasa, S.S., Abeyasisrigunawardana, M.D., and Davenport, J. 1997. *Coastal Conservation Through Enterprise: A Case Study of Rekawa Lagoon, Sri Lanka.*

Krishna, K.C., Basnet, Kedar and Poudel, K.P. 1999. *People's Empowerment Amidst the Peaks: Community Based Conservation at Annapurna Conservation Area, Nepal.*

Manu, K. and Jolly, Sara. 1999. *Pelicans and People: The Two-Tier Village of Kokkare Bellur, Karnataka, India.*

Pant, Ruchi. 1999. *Customs and Conservation: Traditional and Modern Law in Arunachal Pradesh, India, and Annapurna, Nepal.*

Pathak, N. with Gour-Broome, Vivek. 1999. *Tribal Self-Rule and Natural Resource Management: Community Based Conservation in Mendha (Lekha), Maharashtra, India.*

Raja, Nacem Ashraf, with Ibrahim, M., Ali, Roze, and Aslam, M. 1999. *From Alienation to Ownership: Conservation and Development in Hushey Valley, Pakistan.*

Saigal, Sushil. 1999. *Does Community Based Conservation Make Economic Sense?*

Shresth, S., with Shridhar Devidas. 1999. *Forest Revival and Traditional Water Harvesting: Community Based Conservation at Bhaonta-Kolyala, Rajasthan, India.*

Suryanarayanan, J. and Malhotra, P. with Semwal, R. and Nautiyal, S. 1999. *Regenerating Forests, Traditional Irrigation and Agra-biodiversity: Community Based Conservation in Jardhargaon, Uttar Pradesh, India.*

These will all be published in 2000, and available with Kalpavriksh.