

Conservation Of Shristi Kanta Lokeshwor A Challenge For The Conservators

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Almost four years ago, when I was deputed from CCLCH to study the problems in Shristi Kanta Lokeshwor at Nala, I had the first opportunity to visit this temple. During the study, it was known that not only the temple but also the surrounding buildings in the temple complex were badly infected by termite attack. Most of the wooden structures of the temple were in bad condition. The condition was so severely bad that only termite control was not going to improve the condition of the temple. At that time, it was reported that if not renovated in time the temple might collapse, but due to budgetary problems, it was not possible to do anything at that time. Three years ago, when Kavre Integrated Project took the responsibility of renovating the temple, the writer had another opportunity to visit the temple. In this way, I was associated in the project of renovation of Shristi Kanta Lokeshwor. Since it took almost three years to complete the renovation works, we got time to think of many alternatives that could be employed to over-come the problems. We adopted all the measures that are normally done during renovation of a normal monument but it was noticed that these

measures were not providing the solution that we had desired. Thus, finally we decided to jump to this venture of searching for the termite colony itself.

Shristi Kanta Lokeshwor temple is located at Nala almost three kilometer north of Banepa municipality. Nala is an ancient traditional city like the city of the Kathmandu Valley. The temple of Shristi Kanta Lokeshwor is believed to be built in the late Lichhavi period; the evidences of which is not available today but the small stupa now present on the top of the entrance gate indicates that it should have been built in the late Lichhavi period somewhere in the complex of the temple but due to some reasons it has now been placed on the top of the entrance gate. The temple has gone renovations at several times most probably due to termite attack. The temple complex had been so badly attacked by termites that the surrounding buildings located in the northern, southern and eastern side of the main temple had also been badly damaged by it. Even the paved courtyard of the temple complex had huge number of termite when a single piece of stone of the pavement was removed. Therefore, it was a great challenge for the

conservators to control termite in the temple complex. A mere spray of the insecticide solution was not going to be sufficient. Therefore, it was decided that during renovation of the temple all the wooden structure whether new or old would be dipped in the insecticide solution before use, but that was also not going to be a permanent solution. Hence, it was decided by the project-in-charge Mr. Rajesh Mathema and the writer of this article to search for queen termite in order to provide a permanent solution for termite attack in the temple complex. During our mission, Mr. Bharat Nepal of ATC-S.B. Conservation Center, a private organization working for the eradication of termites in private buildings and monuments and very much eager to learn new techniques in the field of insect control joined us free of cost and remained with us during our whole mission. The work of search was completed in two weeks.

Now, it is better to have an understanding of the life cycle of termites before discussing conservation procedure in the temple complex. Termites are soft-bodied, social insects, pale in color, thorax wide at its junction with the abdomen. Mouthparts are biting and chewing type. They neither are ants nor are they white in color but as they live in eternal darkness and are pale in color, hence the popular name white ant is used. The two pairs of wings are similar and are in the resting condition. Termites can be distinguished from ants by the absence of a constriction or peduncle between thorax and abdomen. Termites fall under phylum Arthropoda, Sub-phylum Mandibulata, Class Insecta and Type Termite.

There are three stages in the life cycle of termites:- egg, nymph and adult. Life cycle is completed in 5 to 8 days. That is why population becomes dense in a short period. Termites are polymorphic and include two forms:- A. Reproductive B. Sterile.

A. Reproductive or Sexual castes:- The fertile males and females of the termites are of the following forms:-

1. Macropterous or winged forms:- These are winged kings and queens. The color is yellow brown or black wings are four in numbers, larger than the body and very well developed. Ultimately, these wings are discharged and their bases remain attached.
2. Brachypterous or short-winged forms:- These are supplementary reproductive individuals consisting of both kings and queens. Body is less pigmented than that of Macropterous forms. Two pairs of wings are vestigial, short and stump-like. Compound eyes are widely separated and are large.
3. Apterous or wingless forms:- These are called ergatoid kings and queens and in structure, they are similar to workers. The body is not pigmented. Wings are completely absent. Compound eyes are vestigial. Ocelli are completely lacking. All these sexual castes are main responsible for the population growth of the colony.
 - b. Sterile castes:- These forms are without wings and reproductive organs are rudimentary. On the basis of division of labour, these are further classified as:-
 1. Workers:- These are small, white insects, which cause great damage. Head is vertical with small broad jaws. Eyes are completely absent, however they travel in subterranean passage to large areas. They work only during the day-time. Their work is to store food for the colony, look after the nymphs, and build houses for the colony. These constitute 88 to 90% of the total population of the colony.
 2. Soldiers:- They are bigger in size than the workers. Head is long and large. They consti-

tute 2 to 8% of the total population of the colony. Their main work is to defend the colony from enemy.

3. **Nasutes:-** There is a second form of soldiers which have vestigial mandibles but their head is prolonged into a long conical snout. These are also soldiers and defend the colony from enemy by secreting a special type of fluid from their body.

The chief food of termite is organic materials present in the wood, paper etc. Hence, they are very dangerous to our monuments where plenty of wooden structures are being used. Salwood (*Shorea robusta*) have been found to be more resistant towards termite attack due to their compact structure of cellulose cells. Other wooden structures made of Sisam or Pines trees are more vulnerable towards termite attack due to their loose bonding of cellulose cells. Another important factor that can play important role in preventing termite attack is the quality of the timber being used during renovation of the monuments. Well-seasoned timber has been found more resistant towards termite attack.

During renovation of Shristi Kanta Lokeshwor, all the structures up to the plinth level were dismantled and hence it was decided to spray a 1% solution of Chlorpyrifos 20 EC in water all over the plinth level and there after on each layers of brick works up to five feet. Simultaneously a trench 3 feet deep and 1 feet width and 3 feet away from the plinth level was dug all around the plinth level and a 1% solution of Chlorpyrifos 20 EC in water was poured at the rate of 2.5 liter per square meter and then the whole trench was filled with soil. Similarly for the eradication of termites from the courtyard, a hole 3 feet deep was made at a distance of 1 meter throughout the courtyard and 2.5 liters of the insecticide solution were poured in each hole. Finally, all the holes were sealed. Similarly, all the wooden structures whether new or

old were dipped in a 1-percentage solution of Chlorpyrifos 20 EC in linseed oil and turpentine oil. The pati present in the northern side of the temple complex was also sprayed with insecticide solution diluted in water. Not all these measures were going to provide a permanent solution for the control of termites in these areas because of the density of the termites present in these areas. Hence, it was decided to search for termite colony itself.

During our search, initially, the possible areas where termite colony might exist were located based on the habit and habitat of termite. As it is, clear that termite colony may exist in damp and humid places and the colony can not be more than 3 feet deep inside the soil layers. In addition, the surface soil where the termite colony may exist is loose. The proper seasons for the search of termite colony is the last of June or the beginning of July. So it was also decided that the search program would be conducted in the above mentioned period. The five spotted areas were as follows:-

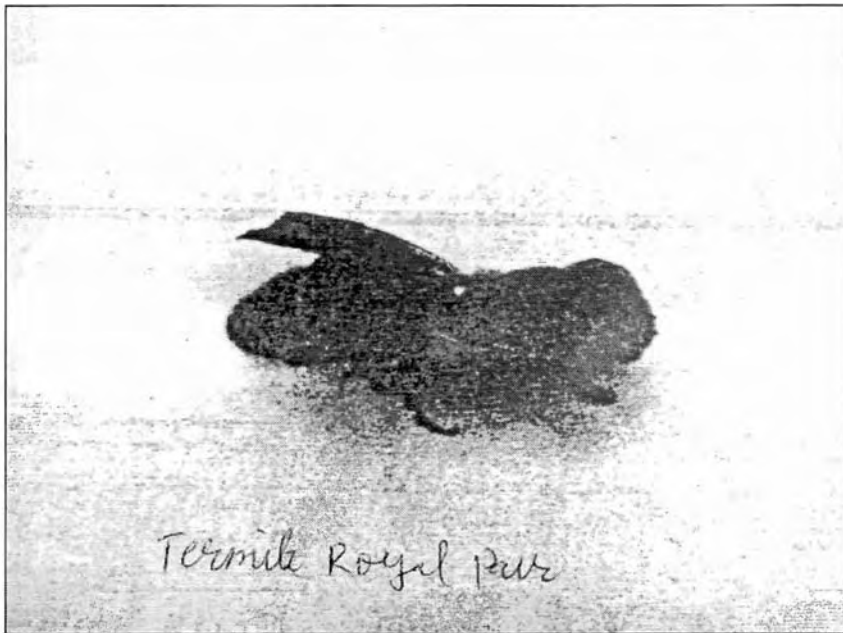
The first spot was outside the temple complex just near the Northeast corner along with water supply tank. The second spot was in the extreme east room of the Northern Pati. Attached to this second spot on the western side where the family of the Pujari lives and uses the room as kitchen and kitchen sink was spotted as the third spot. Similarly, Northwest corner of the temple complex was spotted as the fourth spot. Southwest corner of the temple complex was spotted as the fifth and final spot where the termite colony might exist.

Now the search for the termite colony was started from spot number one. We dug the ground unto three feet deep, but we could not find the termite colony. Of Course, a large number of termite workers were found but not the colony itself. Similarly, in spot number two also we could not find termite colony. On the fourth day of our search, as soon as we



Wooden Portion attacked by Termite

Photo by M.K. Sharma



Termite

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started digging in the spot number three we found the termite colony. As soon as we found the colony, we caught termite queen and king and killed them by the use of insecticide solution. Ultimately, the complete colony was destroyed by the use of insecticide solution, but our search was continued in spot number four where although a large number of young termites were found but not in the form of colony. Similarly, in the spot number five also no termite colony was found. Therefore, it was a great achievement for our team to achieve a permanent solution for termite control in the temple complex.

Since it took almost three years to complete the renovation works of Shristi Kanta Lokeshwor temple, all the brick works obtained moisture during rainy seasons of the years and developed lower plants like algae. The brick portions were cleaned off using Jute brushes. It was a complete dry cleaning since no solvents were used. After cleaning of the brick works, a preservative coating using a 4% solution of ethyl potassium Siliconate in water was applied. Ethyl Potassium siliconate although soluble in water remains no longer solution in water when exposed to environmental condition for twenty-four hours, since it is oxidized to polymeric forms. The non-gilded copper sheets were cleaned by using 1% solution of sulphuric acid while the gold-gilded portions were cleaned off using a 5% solution of citric acid. No preventive coating was applied in the copper sheets due to budgetary problems. A 2% solution of poly vinyl acetate in toluene was applied in the gold-gilded portions.

Dipping the objects in an insecticide solution or spraying the insecticide solution in the affected areas can check insect infestation or can prevent further infestation but at the same time it may not be a sufficient solution for complete eradication of insects. Dipping or spraying of insecticide solution is preventive measures but not a permanent solution of

insect control in the buildings and monuments. Highly infested monuments, palaces and buildings can only be prevented from insect attack by destroying their colony. Although the search for insect colony requires great patience and labor it should always be attempted where permanent solution is required. A permanent solution of insect attack in highly infested areas like Gorkha Durbar and Nuwakot Durbar can only be achieved by destroying the insect colony itself since dipping and spraying of insecticide solution in these places have only proved to be a preventive measures but unable to destroy the whole colony of insect and still a large number insects are visible in Gorkha lower palace.

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