Innovations for clean water

ATB

Practical Report
Coffee finca

Mexico:

From a coffee finca to an Eco-Pioneer

In 2002 ATB installed a wastewater treatment plant in the jungle of the mexican county Chiapas for highly loaded wastewater from the coffee harvest. Since then, however, a lot has been done in the country of the Maya – where nothing is any longer as it was before ...

DAGOBERT BAUMANN

Biological wastewater treatment under extreme conditions

2002

Foto: Uwe S. Meschede

For the preparation of the recently picked beans a lot of water is needed

Inspection by an envoy of the Mexican water authority

We made the first journey to the site of the wastewater treatment plant in Chiapa/Mexico in December 2001. On this occasion it was possible to gather first information on the type of wastewater. The task is the treatment of highly loaded wastewater from the coffee harvest. Tests with degradation have shown that biological treatment is possible. Through this trial the final capacity of the plant was established at 2,500 PT.

For the acceptance of wastewater during the period of the harvest from October to December and for the continuously produced faecal wastes from inhabitants and workers the plant was subdivided into two independent zones. The plant technology corresponds with that of the AQUAMAX® XL. The smaller zone, operated all year round, serves for the treatment of faecal wastes and the degradation and conservation of activated sludge. The larger zone was switched in at the start of the harvest period and was seeded using the activated sludge from the smaller system.

With the preparation of the plant control system particular value was placed on the management of fluctuations in flow and partial network overloading during the harvest period.

Power supply for the control unit is buffered using an accumulator and the acceptance capacity of the plant can be reduced with overloading of the network. The construction of the tank and the operations building was taken on by the national water authority and realised by a local builder.

The mechanical engineering element was collected on 08.05.02 by the shipping agent and shipped to Veracruz. Our anxious questions... "would the ship arrive on time?"..."will the customs release the plant without delay?" and "will the transport from arrival port to construction site go smoothly without problem" were not completely unjustified. The ship was two days late, the customs saw problems and transport to the construction site took three days. It was a good job that we had planned a couple days of breathing space before the start of assembly.

Harald Galatis, Marcel Claß and Dagobert Baumann set off on the journey

A congenial troup: the Mexican specialists for the power supply

Aeration units in the large SBR

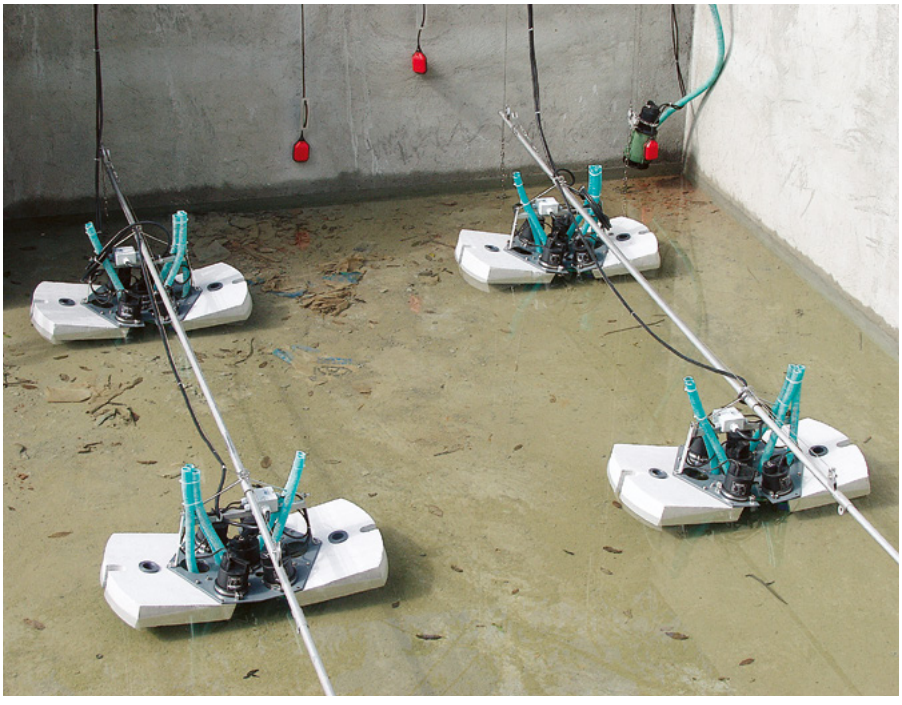

Photo: Uwe S. Meschede

The sugar cane found everywhere in Central America is ideally suited for the planting of the system

in order to carry out assembly on-site. Three days of delay to the start of construction, the bad weather (rainy season) and the high temperatures did not allow the work to precede as rapidly as we had planned. The small activated sludge stage for the treatment of the faecal wastewater and for the build up of activated sludge was commissioned. Final completion of the complete plant was planned for August 2002.

„The procurement situation on the Mexican market was not entirely simple..."

Mr. Galatis had travelled in order to monitor the building of the hydrophyte treatment stage. Unfortunately it was realised too late that the sheeting for the sealing layer could not be so easily procured on the Mexican market.

Selection of suitable filling material also required several long and tiring days of travel to several gravel works. Here it was not possible to obtain the necessary level of purity as we required: the sand obtainable at no cost from the pacific beaches here appears to be the only usable filling material. The still missing sealing sheeting is now also meant to turn up finally at the end of July.

In the end the remaining tasks were completed in September 2002 so that the plant was now fully functioning.

Deployment on-site in both the first weeks in September were again necessary to set up the downstream covered soil filter, the sludge humification plant and to complete the SBR plant.

Sugar cane – the ideal plant for the biological degradation process

As there is still no experience in Mexico with regard to soil materials and planting, it is to be established with this object what is most suitable in this sub-tropical region of Central America. In this respect, at the end, there were still several problems with the search and the selection of suitable plants.
Nevertheless, we were also successful here after long searches. Amongst others the sugar cane plant which, in sub-tropical Mexico, finds ideal prerequisites for a rapid and healthy growth, showed itself to be suitable.

Integrated concept for highly loaded wastewater

On the Finca Argovia (farm) both highly loaded wastewater from coffee processing and domestic wastewater are produced which are treated within the scope of an integrated concept.
Following a three-stage mechanical pre-treatment (settling tanks Vk 1 - 3) the water enters the buffer tank. This wastewater is then fed to the biological treatment by means of feeding pumps.
The different streams are treated in two separate SB reactors: the wastewater from the plantation workers (100 PT) goes into the first line (SBR 1), the process water from coffee processing is treated in the second line (SBR 2) during the harvest time only.

Parallel to this the settled sludge from the pre- settling stage is placed on a vegetated soil filter and the surplus sludge from the biological stage on to a humification bed. The water percolates through the body of the filter and runs off via the drainage. The remaining percolation water is fed back into the plant via a return flow system and is incorporated there in the current process. The treated water from biological treatment is discharged directly into a receiving water.
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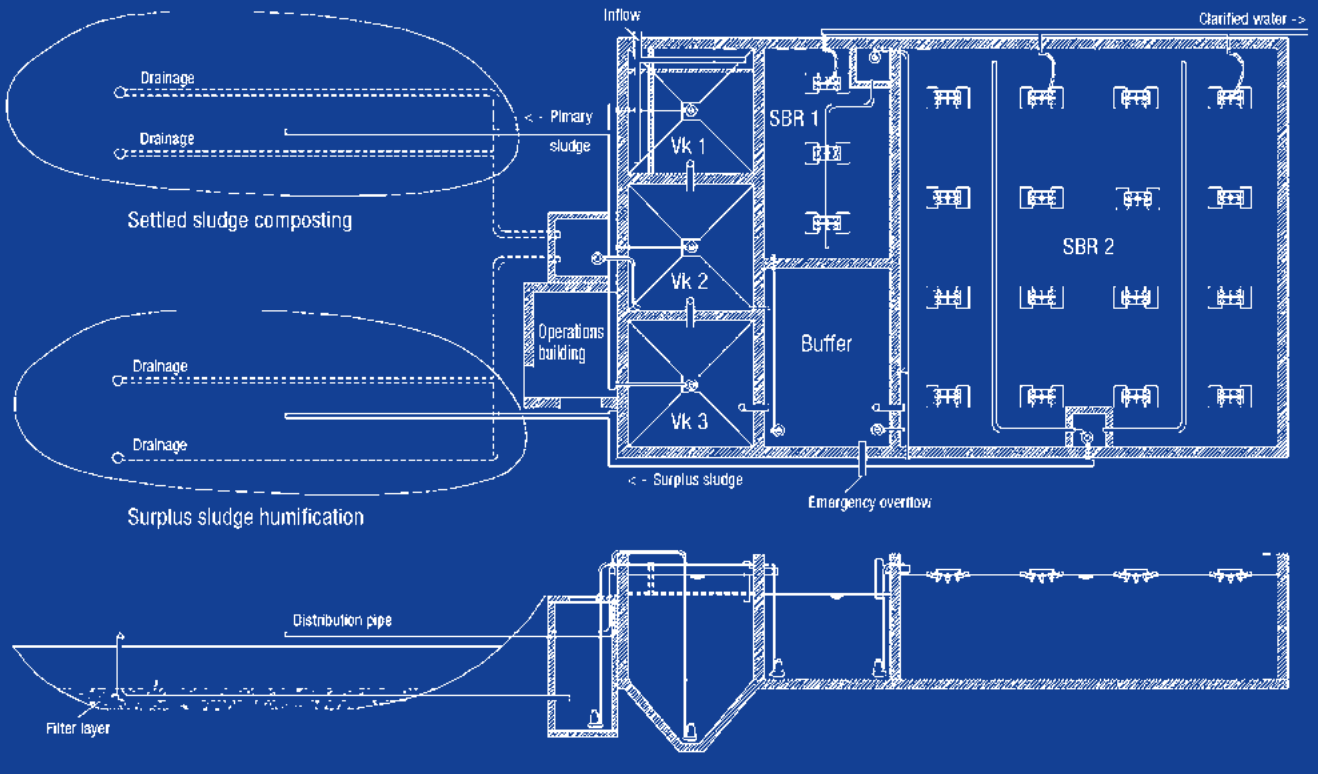
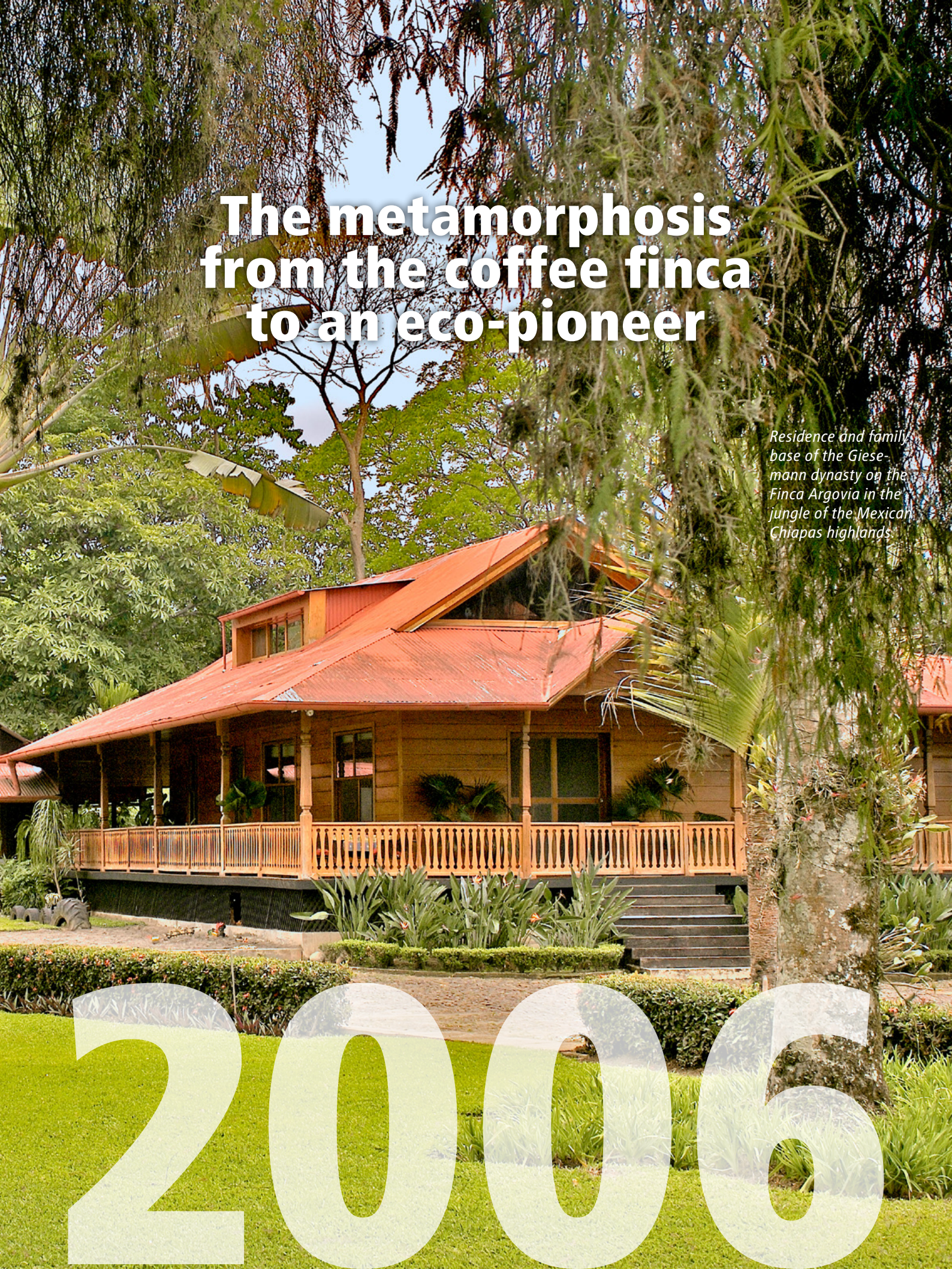
The Finca Argovia project 2002 at a glance:

Owner	Finca Argovia, Bruno Giesemann
Project management	Aquaplan GmbH
Implementation	ATB Umwelttechnologien GmbH (wastewater technology) Aquaplan GmbH (Sludge humification and helophyte bed)
Support	Comisión Nacional del Agua (CNA) with implementation
	DEG Köln (financing within the scope of a PPP-promotion programm)
Costs of plant technology	Ca. 65.000,- €
Commissioning	2002
Required treatment performance	No limiting values; best possible treatment of wastewater under economic aspects desired



The metamorphosis from the coffee finca to an eco-pioneer



Residence and family base of the Giesemann dynasty on the Finca Argovia in the jungle of the Mexican Chiapas highlands

2006

REPORT & PHOTOS:
UWE S. MESCHEDE

In the meantime, up here, in the fifth generation of the former German immigrant, a coffee is produced that could hardly be of any higher quality due to the ecological cultivation, longer ripening times and sensitive processing. However, the cheap offers from Asia and South America make the business with the outstanding beans ever less lucrative, sinking margins are forcing those oriented on quality to re-think things. – Following periods of continuous stagnation, the Finca Argovia has mastered this process successfully: in addition to the cultivation and export of tropical plants as well soft jungle tourism, coffee today is only one of the three pillars of the traditionally rich finca ...

Although the employees of the Finca Argovia still continue to fill annually between 4,000 and 5,000 sacks with un-roasted coffee, the production of over 17 tonnes of beans alone is no longer enough for the survival of the company founded in 1896 by Adolf Giesemann.

The cultivation of tropical plants (Photo at the top) and their marketing, mainly to North America, as well as the expansion of an ecological jungle holiday resort with several jungle houses, therefore today contribute an essential part on the continuation of the formerly purely agriculturally oriented business.

It is boiling hot and sticky in Tapuchula which, economically the most important town in the Mexican federal state of Chiapas, lies on the Pacific coast. To be found approximately one and a half hours drive in an north-easterly direction from there, far above in the highlands and not far from the Guatemalan border, is the Finca Argovia.
Up here, in the old Maja region, in the land of this legendary culture which has left us with so many puzzles, secrets and myths, the climate is a little more bearable even if the humidity of the jungle turns the skin rapidly into a warmly damp target for mosquitos.
Bruno Giesemann (photo) and brother Ricardo are not used to anything else. They were born here and manage, in the fourth generation, the land obtained by their great-grandfather towards the end of the 19th century – the last German-speaking generation as one can already suspect from the adolescent fifth. And thus, as every generation is a child of its time and has its own conception of life, so also are the two brothers who have not remained uninfluenced by the changed world and the associated environmental problems involved with this. Their idea: everything that their finca produces should be ecological. No more increase of productivity at all costs but rather the sustained use of resources, taking into account the cycles of materials and nature, should be at the forefront of their activities. With production methods which take care of nature – taking into account the findings of ecology and environmental protection – their finca should contribute to the protection of the en-

Water in Mexico

Mexico is not yet a country with an extreme shortage of water, quite the contrary: if one translates Mexico's water resources into a per capita figure for her inhabitants then every person has 153 litres of water available per day. Theoretically. However, in reality, this is faced by an intolerable shortcoming: the water from the rivers is fed into the cities, the rural regions are left high and dry.

The future also offers little respite: in Mexico the groundwater level sinks year by year while the water pollution increases. In the last fifty years water resources have been used up which were between 10,000 and 35,000 years old. In the region of La Laguna the drinking water is already being provided from ever deeper layers where there is a high salt content. The formation of deserts is advancing and even in Mexico City, which was previously called the Venice of America, the last wells are drying out.

The story: From head forester to great land owner

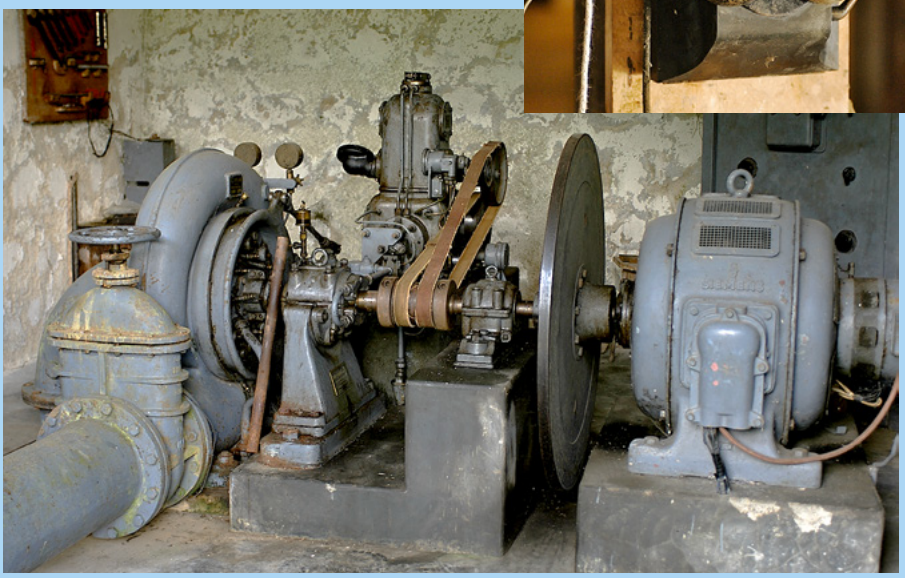
Once upon a time glamorous and elegant, today forlorn and overgrown: the old stately home of the Giesemanns on the one time main Finca Viola with a lot of relicts of the past.

He came at a time when travelling was still difficult, when the insatiable wanderlust demanded much more than stepping over a gangway, when the lust for adventure could not be satisfied through the mail order catalogue: Adolf Giesemann. He was not badly off in the Germany of that time – after all he had a good position in the empire as head forester with an assured pension. However, he knew quite well that a life beyond the familiar surroundings had much more to offer than a warm easy chair in the cool monarchy ever could. Therefore in 1892, the man, born in Hamburg, emigrated to Central America's Guatemala and there, as agent of a Hamburg business enterprise, familiarised himself with the unusual climate, the Guatemalan customs and the Spanish language. Still it did not take long for him to become independent as a coffee producer exporting his own coffee to his home country. Finally, in 1896, the Hanseat hired several trustworthy employees from Germany and, bit by bit, bought up several fincas in Soconusco, the Mexican highlands of the province of Chiapas, near to the border with Guatemala. In the course of time Adolf Giesemann became a great land owner and coffee baron.

Business boomed – until the economic crisis in 1929. The collapse of the world market hit this region, which was dependent almost exclusively on this one consumer commodity, with immense severity. In the five years from 1928 to 1933 the world market price of coffee fell by more than 60%. Even smaller coffee planters now became victims of the crisis and had to sell their plantations. The result was even greater concentration of land in the hands of a few great land owners.

The next blow was not slow in coming, due to the 2nd World War: in June 1942 the then President of Mexico, Avilo Comacho issued a decree through which 77 coffee plantations in Chiapas were confiscated. The fincas were now under the administration of a state trust company. For the first time since their settling there, the German coffee planters in Chiapas had an existential problem.

However, even the confiscation of the coffee plantations was, ultimately, only a brief episode. Between 1946 and 1950 the confiscated plantations were handed over again to their ethnic German owners, and although the enterprises were rather run down due to the lack of experts, they were already making a profit a short time later – the post-war upsurge in Germany and the expanding domestic market in the USA soon had the cash registers ringing in the coffee business. The German families rapidly occupied their old positions again at the top of the coffee planters in Chiapas, even if it was no longer completely in quite such a dominating style, as the new agricultural statute book of 1943 restricted the ownership of land by one single person to a maximum of 300 hectares. However, this did not disturb anyone further. The large plantations of the German families were simply distributed pro forma to family members, friends or front men/women; simply out of the previous large finca of the Giesemanns there appeared several small ones.



74 % less energy consumption, 74 % less costs: Eliazar Montejo Gonzalez, responsible for the wastewater treatment plant of the finca, observes the new AQUAMAX® PROFESSIONAL XXL-1.

vironment and protect it from further destruction.

The conversion from conventional agriculture with all its negative effects – for example the formation of algae in surface waters through the over-enrichment of nutrients, the reduction of the wide variety of plant and animal species and the greater susceptibility to illness and pests – to an ecological type of agriculture, demanded a great deal from the two brothers. They did without artificial growth regulators and chemical synthesis products, created better growth conditions for the avoidance of illnesses and pests and, through special methods of cultivation, imitated nature's growth model as well as its harvesting efficiency. And: as first coffee plantation in Latin America, the Giesemanns treated their entire wastewater before they fed it into the environment.

The commissioning of this first Latin American coffee finca wastewater treatment plant took place in September 2002. The domestic wastewater of the finca household and that of the plantation workers was treated in the first tank of the plant using a fully biological AQUAMAX® XL-S SBR wastewater treatment plant for up to 100 PT, consisting of three AQUAMAX® aerator islands. In a second tank the process water from the coffee processing was treated, also using a fully biological AQUAMAX® XL-S SBR wastewater treatment plant for up to 2,500 PT, consisting of 16 aerator islands.

However, as so often in the story of the Giesemanns, in the period following this, something essential changed for them high above in the jungle: as the ecological cultivation of quality coffee no longer achieved the real net output necessary for survival, due to cheap suppliers from Asia and South America, the finca began to earn a further part of its income with the export of tropical plants – many to North America – and also with a form of ecological jungle tourism. A large part of the Giesemann land was cultivated appropriately for this, jungle houses with fantastic views of the wild landscape were built, a restaurant-café was put up in the middle of the jungle and sufficient specialist staff was recruited. Environmental experts began to guide interested groups of visitors around the finca, to explain the ecological methods for the cultivation of coffee and exotic plants, to demonstrate the fully biological wastewater treatment plant with the downstream plant bed, to explain the ecological idea of the Giesemanns and to provide a view from the Mirador de la finca on to the still active volcano Tacaná beyond the Guatemalan border. And for those who are still not satiated after all this, one of the biologists acts as escort to the display of birds of paradise of which there are a very large number to be observed: from colibri to tucan, from falcon to wild budgerigar.

Business started up again, the combination of environmental awareness, coffee, plants and tourism appeared to be working economically. Nevertheless: the ecological ideals of the Gie-

semanns – and along with these the costs, above all for the growing energy consumption – compelled some rethinking.

Therefore, in favour of an improved energy efficiency, in 2006 the finca invested once again in its ecological ideals as well as in the fully biological AQUAMAX® technology, which had proved itself over many years, and exchanged the 16 consumption-intensive AQUAMAX® aerator islands from the larger of the two SBR tanks for a considerably more economical, brand-new AQUAMAX® surface aerator as well as a new XXL control unit. Bruno Giesemann: "We wanted the same system, the same principle, the same reliability, the same treatment performance and the same comfort as with our first plant.

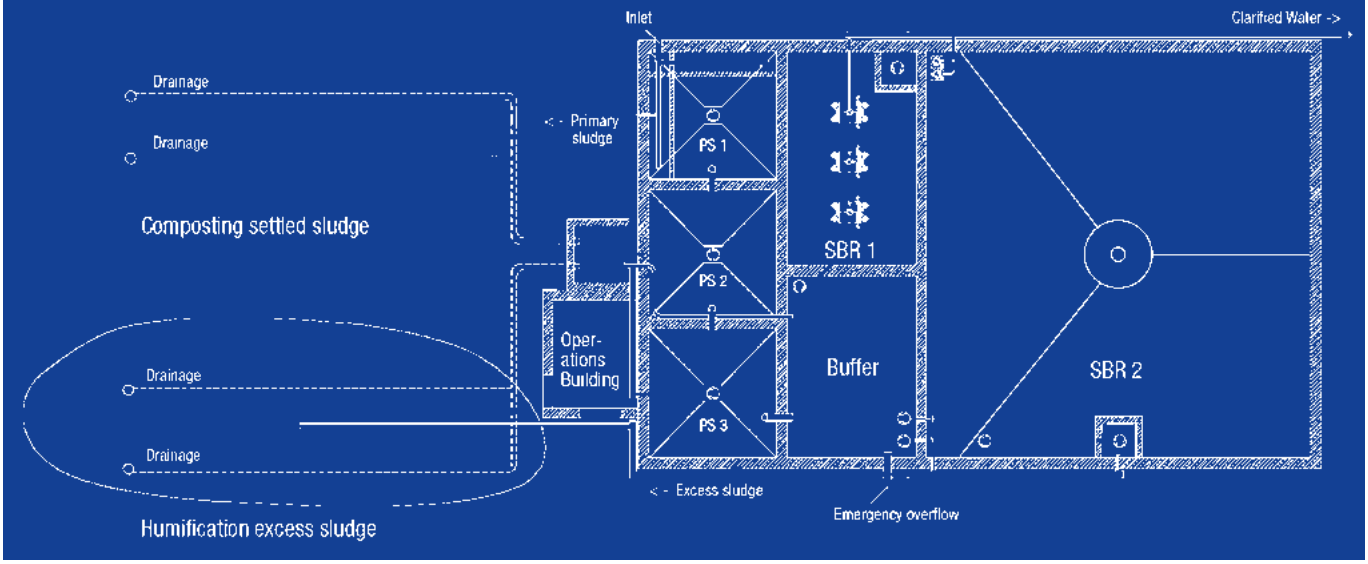
Only: we just wanted to consume considerably less energy for this."

The result is worth seeing: while the original plant used ca. 275 kilowatt-hours of energy per day in 24 hour operation – during the harvest period – the new AQUAMAX® aerator with the new plant control requires a maximum consumption of just 72 kilowatt-hours per day. Savings: fully 74% - both for the finances of the finca and also for the environment.

The example of the Giesemanns and their "new" Finca Argovia show that the protection of our Blue Planet and economic activities – if one is prepared for it - do not have to exclude the rethinking of conventions, the consideration of traditions from other angles and, if necessary the treading of new, unknown paths ... Apropos paths: it does not matter which path you tread today on Argovia - you always meet a sign on which you are reminded: "El agua es vida. Por favor no la contaminemos" – "Water is life. Please do not contaminate it."

The Finca Argovia project 2006 at a glance:

Owner	Finca Argovia, Chiapas/Mexico
Project management & implementation	AquaTec México, Tlaxcala/Mexico
Plant technology	ATB Umwelttechnologien GmbH
Plant size	AQUAMAX® PROFESSIONAL XXL-1 for 1.000 PT
Comissioning	2006
Discharge values	COD < 33 mg/l BOD_5 < 10 mg/l



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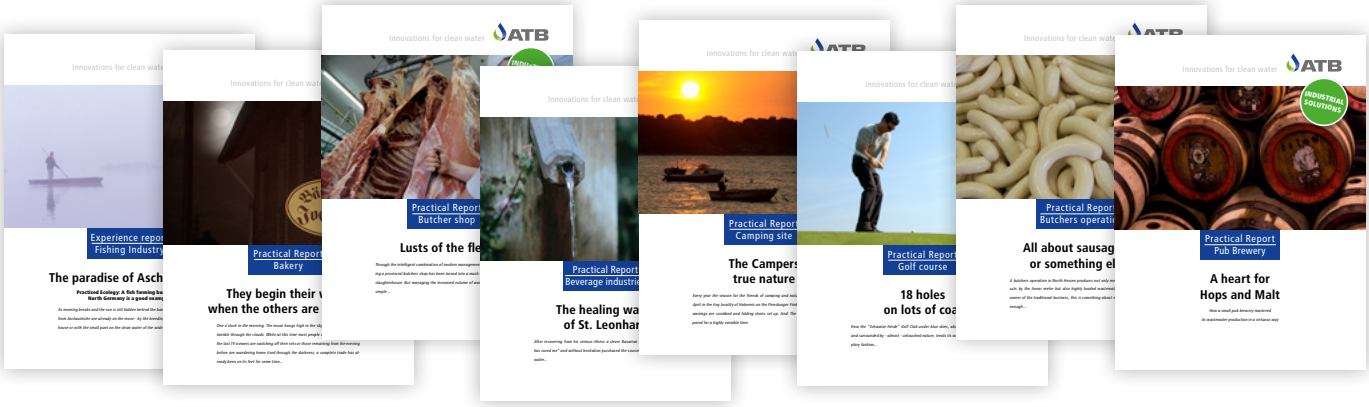

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