

A Surprise Trip to the Amazon by Richard Komp

I had planned to spend the entire summer working in Maine; but in early June I got a call from one of the students from the University of Dayton in Ohio. Only he wasn't in Ohio, he was in a small village called Porto de Moz on the Xingo River, a large tributary of the Amazon in Brazil. In September of 2009, John Burke and I gave a solar workshop for the ETHOS group at the University of Dayton where we taught the students how to build photovoltaic (PV) modules. Two students from the ETHOS group were in Brazil working in this remote village, teaching the native people how to build these modules, but they hadn't themselves taken the course John and I taught (They did however, have a copy of the video that was made of our course). Michael and Phil, the students had a lot of questions and after a couple of breaking up Skype calls, Mike finally said: "You have to come down here right away."

Richie Bouthillier, a missionary from the Vineyard group out of Canada was organizing the solar cottage industry project and helped me arrange plane tickets from Boston to Altimira on the Xingo River. It took four airplane legs and an overnight boat trip on the river to get to the village. The final air leg was in a small two engine turboprop that had to circle around to land on the tiny airstrip on its second try, barely under the low hanging clouds but Richie, Michael and Phil, the other ETHOS student were waiting for me. We stayed in Altimira for two days getting glass cut and other supplies like aluminum frame material to build the PV modules. One of the problems was that the \$330 kit of special silicone encapsulant disappeared from my checked luggage during the trip, most likely at LaGuardia airport but they have no record of that happening either there or Miami (John Burke checked on this while I was in Brazil and we determined the silicone disappeared in the US). I worked out a way of encapsulating the smaller modules we would build without that special silicone, but the big 65 watt modules would have to wait to be finished after we replaced the missing material.



Leaving Altimira on the Lineboat for the overnight trip to Porto de Moz

The overnight trip on the diesel powered "lineboat" was very interesting but the accommodations were a bit primitive. You brought your own hammock and were allowed to hang it together with all the others in one of the decks. The space allotted was not as luxurious as that allotted to the sailors on an 18th century wooden British warship, but we had slightly more room than the "passengers" on a slave ship had. At least it was only one night and they served a supper of rice and something out of a big kettle as part of the \$20 fare. I didn't try asking with my bowl for a second helping.

I spent a little over a week at Porto de Moz, getting ready and teaching a 6 day workshop on photovoltaics. We started by making four of the little solar battery chargers that take only four PV cells each (which I had cut ahead of time), then opened the boxes of Evergreen Solar cells I had brought and started sorting and soldering PV cells.



Mike testing the set of 36 finished PV cells that will make a 65 watt module. A finished solar cell phone charger is setting over to the left, recharging somebody's cell phone.

Since we didn't have the special silicone encapsulant, we went all the way with the work to the point where we would mix the silicone with its catalyst, then carefully stacked the assembly away until they got some silicone shipped into Brazil. In the meantime, I taught them how to sort and cut the PV cells into useful shapes and we made a more than a dozen solar cell phone chargers. In remote areas of Brazil, like in most other developing countries, cell phones have become the norm. While here can be a wait of a year or more to get a land phone line run to a home, you can just go almost anywhere and buy a cell phone and a card worth so many minutes. Solar powered cell phone towers are cropping up everywhere, but people in remote places need some way to recharge their cell phones in places far from the power lines. The biggest problem

is finding the proper plug to fit into a particular cell phone; there seem to be a zillion different styles. I am asking people to save old cell phone chargers (even those that don't work anymore). I cut off the cord and plug and save them to give a wide selection of different styles for this work.

In addition to the PV module work, we also fixed up a solar cooker they had built from Grupo Fenix plans, and visited some remote homesteads to visit and talk with the people about their getting some solar electricity. I taught the natives how to design and install the PV systems in addition to how to make the PV modules. We also went spear fishing and swimming in the river. Nobody got nibbled on by piranha fish but I discovered that piranha taste quite good. Who is the top predator in the Amazon?



Traveling to a remote homestead in a dugout canoe with a homemade outboard.

When we got back to Altimira (on another overnight lineboat trip) we spent two days there designing a backup PV system for the community center where we were staying and I also worked with a couple of people who are working to reintroduce sailboats to the area. Since fossil fuel is very expensive and getting more so, this is a good idea. I designed a sail rig for a small sailboat they were building and also showed them how to install flotation to the boat. The wood they use is very hard and rot proof but it is so heavy that it doesn't float in water. I also suggested how to add a couple of simple masts to the lineboats so they don't have to use so much diesel fuel. I calculated that it probably takes two gallons of diesel fuel to get one gallon where they use the fuel in the Amazon. It is probably the same ratio on the Miskito Coast in Nicaragua.

After I left, a small supply of the silicone encapsulant arrived and they successfully finished up the 65 watt PV modules we started. I will be going back to the Amazon next May with more of the ETHOS students to continue the workshops. We will start making the big PV modules using the ethylene-vinyl acetate (EVA) encapsulant and a solar cooker instead of the expensive silicone. We have written a scientific paper for the American Solar Energy Society on how to use solar ovens instead of the expensive laminating machines to encapsulate with the EVA and I will be happy to send anybody a copy.