

Sustainability Program / Motor Yacht Tucano

Amazon Nature Tours embarked on a program in 2017 to make their vessel, the Motor Yacht Tucano, and the expedition cruises they operate, the most sustainable in the Amazon. This entailed the elaboration of a very detailed sustainability plan that includes not only the pioneering of novel mechanical systems but, as importantly, policies of operations, staffing, and tour conduct that ensure that the cruises promote cultural sustainability as well as sharing the benefits of tourism with local communities.

The efforts in sustainability fall into five general categories:

- Traveler Engagement
- Solar Energy Equipment
- Ship Design
- Ship Procedures and Staff Commitment
- Responsible Tour Conduct
- Social Responsibility

Traveler Engagement: True sustainability is a collective effort and on the cruises the staff and travelers work together as an expedition team. Some of the vessel's sustainability policies ask the travelers to adjust how they think about energy use. There is no suffering or discomfort, but engagement on the part of the travelers is essential to effectively implementing any sustainability policy. Generally travelers agree that the small inconveniences are worthwhile in order for them to be able to participate in preserving one of the last truly wild places on earth.

Travelers are asked to join the staff in the mission to enjoy this wonderful reservoir of life, but in as sustainable a way as possible. This spirit of collaboration begins on the day of embarkation when travelers find in their staterooms a very detailed booklet explaining the sustainability procedures. These procedures present only minor inconvenience and almost all travelers appreciate the efforts to minimize negative environmental and cultural impacts. Tucano staff members encourage travelers to themselves share in the sense of commitment to the environment as part of the expedition experience.

Solar Energy Equipment: The Motor Yacht Tucano has incorporated equipment and design features intended to reduce the carbon footprint of cruise operations. One of the most important of these is to enable all of the basic functions of the vessel to operate without the need for diesel generators continuously producing electricity. On the M/Y Tucano, for the duration of the designated "Solar Power Hours", the shower and lavatory water systems, illumination, cooking, refrigeration, drinking water cooling, ice making, and the propulsion of our launches all work without diesel or gasoline engines functioning. This is accomplished partly through ship design and partly through extensive solar-electric and solar-thermal arrays and customized switching equipment. The M/Y Tucano has pioneered the application of these new technologies to the marine environment through ongoing engineering design, adaptation of existing technologies, and as extensive structural modifications to the vessel.

Ship Design: In addition to specialized equipment, the ship design itself has been adapted to provide travelers with an experience that is both comfortable and sustainable. This has included the installation of two entirely independent water systems on the ship: one solar heated and the other through diesel-electric power generation. To diminish the negative impact of continuous climate control, the ship's windows have been rebuilt so that travelers can open them to enjoy the fresh air while at the same time reducing the need for the constant climate control that is typical of small ships cruises.

Ship Procedures and Staff Commitment: All of the basic functions of the vessel such as cleaning, maintenance, vessel supply, waste management, and navigation are conceived in order to reduce environmental impact, to

protect traveler health, and to enable travelers to experience the environment in the most sustainable way. As sophisticated as machines may be, the real secret to sustainability is not in the hardware, but in the personal commitment of the staff to adherence to these detailed operations procedures. By nature of who they are, but also due to extensive training, all of the vessel crew members share a commitment to making the cruises as minimally invasive as possible and to conserve resources. They implement a detailed choreography of procedures that include conservation of energy, accommodations best practices, and provisioning of the vessel.

Responsible Tour Conduct: The very nature of tourism is such that, if poorly done, it can negatively impact wildlife, the natural environment, and the cultural cohesion of communities visited. The tour activities of the cruises are very carefully crafted to minimize those negative impacts. The field staff, naturalists, woodsmen, and mariners are highly trained in responsible tourism best practices. In all aspects of the expedition experience, from the manner of approaching wildlife, to the visiting of small villages deep in the forest, tours on the Motor Yacht Tucano promote a thoughtful concern for the environment as well as cultural preservation.

Social Responsibility: Sustainability is not just about avoiding negative impacts - responsible tours should also have a positive benefit. The operations of the Motor Yacht Tucano are crafted to both share the economic benefit with the community and to promote conservation of the Amazon. One of the most fundamental commitments to responsible tourism is to provide stable, well paid, long term employment to staff members. The M/Y Tucano does not utilize free-lance or part-time staffing. There is a strong commitment on the part of the company to offering stable and long term employment to all ship and shore-based staff members. All of the staff members of the Motor Yacht Tucano are regular full-time employees and benefit from the extensive support of regular long time employment as well as job security. Many of the crew members have worked for the company 20+ years.

Another important, though not obvious, positive benefit of tourism is the implementation of well considered procurement policies. Amazon Nature Tours has elaborate procedures in place to ensure that ship purchasing is done in a way that offers the greatest benefit to the small scale farmers and fishermen that produce the cruise consumables. As much as possible, the company has established long term relationships with the supply community in Manaus, Brasil and also the small communities visited along the course of the vessel to provide a source of revenue in a way that places high value on preserving wild rainforest as well as wider distribution of revenue from tourism.

Sustainable Tourism and the Future: If done conscientiously and responsibly, tourism can have a very positive affect on both the environment and local communities. As an industry that values education, tourism can offer steady and high paying employment that provides a pathway to future generations, and is perhaps the only type of non-extractive use that can be made of undisturbed tropical forest. Amazon Nature Tours has in the last year tried to elaborate, in the form of their sustainability project, concrete actions to achieve these ideals. The company has sought to create a new paradigm for sustainable cruise tours that will help preserve the environment, provide continued revenue for those directly and indirectly engaged in cruise operations, and to encourage travelers to themselves feel some pride in their sustainable participation in preserving the last greatest wilderness on Earth.

Solar Energy / Minimizing Carbon Footprint

The Motor Yacht Tucano has a commitment to reducing the environmental impact of the use of fossil fuels. This goal has been applied vessel-wide to ship design, equipment, and ship operations procedures. Crucial to reducing our carbon footprint is our use of two different systems of solar power: solar-electric and solar-thermal. These technologies, tailored to the specific needs of our deep forest exploration, have dramatically reduced exhaust emissions as well as fuel consumption of our cruises.

Solar-Electric System

The M/Y Tucano is a pioneering vessel in the use of solar energy in the Amazon. The solar-electric system generates electricity that powers our ship's launches, our freezers and refrigerators in the galley, our passenger refrigerators and water coolers, our ice maker, and illumination in many parts of the vessel. Through a custom-built switching system and an extensive battery array, a great variety of other appliances vessel-wide are energized by the sun, even at night.

Solar-Thermal Hot Water System

Though this may seem counter intuitive for travelers from temperate climates, the constant availability of very hot water is not really essential in the Amazon. Because the climate is hot and the water in the Amazon generally warm, it is very uncommon for residents to have full-time hot water heaters. The Motor Yacht Tucano does have heated water for showers from two separate systems the most sustainable being our solar-thermal system. An important and significant innovation of the M/Y Tucano is that we do not expend diesel electric energy 24 hours a day to heat water. Most water heaters are a very significant consumer of fossil fuel which in turn creates air pollution.

To reduce our carbon emissions the Motor Yacht Tucano was designed with two fully independent showering systems: one that is solar-thermal and another that is diesel-electric. Every stateroom actually has two separate shower heads in the bathroom, one for each system. As close as our cruises are to the strong equatorial sun, the solar-thermal panels are very efficient at warming water which is stored in a heavily insulated tank on the top deck. Throughout the day and night the warm water is distributed vessel-wide by gravity through its own dedicated insulated piping. Of course, if the day is rainy the water will not be as warm, but most travelers find the water temperature perfectly suitable for their needs. As with most sustainability systems, users have to be game to participate and accept some variation from their normal routines. We are very pleased that our travelers are usually eager to join our Tucano team in the journey of exploration. They see themselves as participants and not just observers and become aware of their energy use and partnership in sustainability.

The secondary hot water shower system, though diesel-electric powered, also has a sustainability feature. The water is distributed under pressure via electric pumps through its own dedicated piping system to a collection of "on-demand" electric heaters in each stateroom's bathroom. This is a considerable savings of energy because it eliminates the need to continuously and perpetually heat large tanks full of water. In an effort to calibrate our energy use with actual necessity, this system is engaged only during specific times of day. While this system does require an adjustment to typical routines, for most travelers it is a simple change in scheduling and the steps taken to reduce our carbon footprint are easy ones. These small changes in traveler personal habits have very large and positive consequences for sustainable tourism and the preservation of rainforests. On the M/Y Tucano, all of us pitch in!

Solar Propulsion - The M/Y Tucano's Excursion Launches

Another innovation for the Motor Yacht Tucano is that our ship's launches are configured to be powered with electric motors which are in turn powered by energy from our solar-electric panels. (Our launches also have conventional outboard motors.) A combination of features of both ship and cruise design make this propulsion system possible. The most fundamental starting point in this confluence of decisions is a small group size for the cruise vessel. The capacity of the M/Y Tucano is only 18 travelers - the ideal size for forest exploration. On our excursions we divide into two still smaller groups of a maximum of nine travelers, each group with a naturalist guide and a mariner driver / woodsman. With at most only 9 travelers in a launch, we can use vessels that are not only seaworthy and comfortable, but can be propelled by electric motors. So it is a confluence of design decisions that make this possible: the ship capacity, the launch size, the next-generation and very powerful electric motors, the deep discharge- capable gel batteries, and the sophisticated solar-electric chargers that keep the batteries energized by the sun. So with quiet motors and the absence of exhaust smoke, our small groups enjoy expedition excursions that are not just sustainable, but also thrilling.

Ship Design - Environmentally Minded

The Motor Yacht Tucano was designed from the very start to be the most sustainable vessel in the Amazon. In addition to a very sophisticated solar energy system, the vessel incorporates a number of design elements and operational practices that significantly minimize our environmental impact and promote sustainability. Some of these features described below are: Dual Water System, Passive Solar Design, Conservation through "Small-Spec" Equipment, Accommodations Best Practices, Waste Management, Sanitation Waste Treatment, and Provisioning.

Dual Water Systems - Gravity and Pressure

One very novel aspect of the design of the M/Y Tucano is that it has two completely independent water distribution systems - each with its own independent ship-wide piping. Our primary and sustainable water system is a gravity distribution system. Our gravity system operates without any electrical power at all except a single small pump that can be energized by solar electric energy. All the toilets, sinks, showers, and galley are supplied by this system. The vessel is quiet, capable, and sustainable even with all fossil fuel machines are turned off and when the vessel is at anchor in one of the most pristine natural areas of the planet. This enables the vessel to avoid having generators operating all the time. The secondary shower water system is similar to a conventional marine water system, with diesel engine generated electricity pressurizing a system of pipes and valves. However, as described below, we have also added a number of novel refinements to this system in order to conserve energy.

Passive Solar Design

The M/Y Tucano was designed with large opening windows and high density thermal insulation throughout. In this way travelers are able to use natural lighting during the day reducing the need for electricity for illumination. The windows have insect screens so that, if they wish, travelers can open their windows - the fresh blossom scented air is one of the unexpected pleasures of the Amazon. This immediacy and immediacy in experiencing the rainforest is a pleasure that is lost to travelers in the more typical cruise vessel that features staterooms hermetically sealed in climate controlled bubbles. The staterooms and interior public spaces of the vessel are well insulated to conserve energy and enable travelers to be comfortable.

Conservation of Energy - Equipment Specification

An essential and often overlooked aspect marine energy conservation is equipment specification. The Motor Yacht Tucano employs a "small spec" policy of specifying all of our engines, the main propulsion, the generators and our launch motors, to be as small as possible while efficiently serving their purposes. This helps conserve fuel and dramatically reduces air polluting emissions. Further, most of the engines are of the newest, most fuel efficient generation with significantly lower hydrocarbon emissions. Our ship's launches, in addition to our solar-electric motors, are provided with small-spec highly efficient four-stroke outboard motors. We find that there is no need to roar through the rainforest at high speed when quiet, less polluting small-size motors get us where we want to go much more ecologically. Small scale in most aspects of expedition travel is by far the most rewarding for travelers and expedition staff alike.

Our small-spec imperative suffuses every technical aspect of the vessel. This includes the use of LED lighting vessel-wide, low-pressure water systems, and of, course, the use of solar generated electricity and solar-thermal heating up to the capacity of our arrays. The many large windows in every stateroom and public spaces have all but eliminated the need for electrical illumination during the day. Given that our cruises take place very close to the equator, one of the most demanding of energy uses is air-conditioning. Again, with air-conditioning our small-spec technique is employed to reduce our energy consumption as much as possible. This is accomplished by creating numerous independent cooling zones on the vessel, each with stand alone air-conditioning equipment. This enables us to reduce usage where and when cooling is not needed. This equipment, paired with staff procedures to monitor zone cooling, has reduced our energy consumption very significantly.

Waste Management

Inorganic and organic waste from our galley and hotel services are separated on the vessel. There is an enclosed exterior storage area on the vessel for inorganic waste, which on return to our home port is separated into recyclable and non-recyclable categories and taken to municipal processing facilities. Where possible we avoid the use of disposable packaging. We encourage travelers to use washable drinking cups and glasses instead of plastic disposable cups for all beverages, though disposables are available to travelers who prefer them.

Staff Commitment and Ship Procedures

As efficient and sophisticated as machines may be, the real secret to sustainability is not in hardware, it is in the personal commitment of the staff. Our crew members from the Chef to the Captain use their passion for nature to make our cruises as minimally invasive as possible and to conserve resources. The M/Y Tucano has highly detailed operations procedures to make our cruises as sustainable as possible and our staff use their knowledge, commitment, and creativity to ensure their success.

Conservation of Energy - Crew Vigilance: In energy conservation perhaps even more important than installed equipment are the many procedures we have incorporated into our operations. Of these the most significant is our policy of "solar power hours". During specific times of day when they are not needed we actually turn off all diesel fuel consuming machines. The vessel is designed so that even without diesel generated electricity, all critical functions operate on renewable resources including solar power. The solar power hours are generally in the early morning and late afternoon when the boat is at anchor and most travelers are off the vessel on excursions. The M/Y Tucano remains comfortable even without electrical generation because it is well insulated and because it was designed to offer water and illumination even without electricity. This allows us to reduce consumption of fossil fuel and the resulting emission of hydrocarbons into the atmosphere. The air-conditioning system does not operate during this time, but because the vessel is strongly thermally insulated the interior spaces stay cool. These hours are a good time to enjoy the wonderful stillness of the wilderness and appreciate the subtle natural sounds of the forest. Together these measures enable us to greatly reduce fuel consumption and emission of the pollutants that make up greenhouse gases, oxides of nitrogen (NOx) and hydrocarbons.

Accommodations Best Practices: The Motor Yacht Tucano adheres to best practices typical of sophisticated hotels. The best known of these is the elimination of unnecessary linen exchanges. Unless requested by the travelers, we change the stateroom linens on board the vessel every other day instead of every day. This reduces the energy consumed in washing what are usually still clean linens. Our vessel also has a policy of avoiding highly toxic cleaning products such as concentrated chlorine - an advantage both to our staff and the environment. In addition, the M/Y Tucano does not use any paints containing lead nor do we use paints that contain anti-fouling chemical Tributyltin (TBT). TBT is a biocide used in marine bottom paints, but which has a very negative effect on marine life.

In sum, in the realm of energy conservation we have equipment and procedures in place to conserve energy while at the same time retaining the comfort of our cruises. As noted in the section Solar Energy, our vessel has very elaborate dual water systems to utilize solar power as much as possible. One of these systems uses generator produced electricity for specific times of day, but instead of maintaining a supply of hot water distributed under pressure, travelers use our "on-demand" water heaters installed in each stateroom bathroom. This way the significant energy required to heat water to a comfortable temperature is expended only when needed -- a tremendous savings of energy.

Provisioning, Food Preparation, and Traveler Health: The M/Y Tucano has detailed procedures in place to ensure that the meal services on board the vessel are both healthy for our travelers and help benefit the local communities of which we are a part. The very significant volume of purchasing made in the supply of our expedition cruises is for the most part done in community markets where all of the produce is grown locally and where we buy directly from the farmer. Almost all of the fruits, vegetables, fish, poultry, and beef are grown organically. There are no pesticides, fertilizers, or preservatives used at all. Buying from small farmers also has the benefit that the varieties of foodstuffs available have not been developed for long distance transportation and are therefore more healthful and flavorful. Our chef takes advantage of all of the seasonal varieties available, and we all enjoy the flavors of the exotic fruits and vegetables. These come in handy in our vegetarian dishes which is much appreciated by the vegetarian and vegan travelers that voyage with us.

Finally, our supply staff are very vigilant in verifying that all the fish served on the vessel have been legally caught and conform to any seasonal prohibitions. We are careful to buy types of fish only outside the spawning season and to ensure that any size limitations on caught fish are strictly observed. We try our best to ensure that our cruises have positive benefits our larger community as well as our travelers.

Again, the secret to sustainability is not the hardware, it is in the passion, integrity, and commitment of our crew - and our travelers. We work as a team in deep forest expeditions to look, to listen, to explore, but not to negatively impact the greatest wilderness on earth.

Responsible Travel in the Forest

Visitors to the Amazon can have a very positive impact on the rainforest and its inhabitants. On our expedition cruises our staff and travelers become a team in exploration and sustainability. On arrival on the M/Y Tucano travelers are provided with the very detailed booklet called the *Expedition Guide* which outlines the best ways to enjoy and protect the wild places we visit and to ensure that our voyages have a positive impact. All our staff are devoted to forest preservation. As a team, we and our travelers visit the rainforest with conscience - so that whatever impact there may be will be completely positive.

Zero Impact: We observe a zero impact policy on our expedition cruises. We do not remove anything at all from the forest, no plant material, no flowers, nothing. And we leave nothing behind. Everything that goes with us into the forest, comes back out with us. Yes, we have made a system of trails, but they are minimally invasive. They are not the heavily trodden highways for humans that are typical of most tours, but are instead barely visible forest tracks. To keep our trails from modifying the forest, we do not significantly clear vegetation and we do not walk on them repeatedly, week after week. This way our visits do not frighten off the more shy creatures and our presence does not change the interrelated complexity of life in the rainforest. Our expedition teams, composed of both guides and travelers, stay on these defined trails. We avoid cutting new trails so that our presence does not have a broad impact on the forest as a whole.

Just as important as non-invasive trails are to forest preservation is how we walk on them. When we enter the forest we take no food, no one smokes, and our teams are quiet so that we can fit into the subtle sounds of the forest. We keep noise and excessive talking to a minimum so that the quiet sounds of the forest, to which all the wildlife are very highly attuned, are not overwhelmed. When we do observe creatures we are very careful not to disturb them. We do not get too close and if an animal becomes agitated, we leave the area right away. This caution in the forest is one reason that the places we visit still have populations of the more shy kinds of animals; creatures that permanently flee areas of obtrusive human presence. We never handle creatures that we encounter - an animal that is covered with the human scent can be at serious risk. We do not touch, pet, or feed the creatures we encounter. Though it is becoming a popular tourist activity, we do not visit places that feature swimming with dolphins. These marine mammals are kept in semi-captivity by a feeding routine that disrupts the learning of young animals. The consequence is that they fail to master the hunting skills and migratory patterns that are essential for their long term survival. We avoid flash photography, we do not startle or chase any animal from a nesting place. We are careful in the forest not to disturb the web of life, but this does not make our trips less interesting. On the contrary, it enables us to observe creatures in a pristine environment. Our entire approach is to try as much as we can ourselves become part of the forest environment - to become a small part that observes and admires, but does not modify.

This policy of caution applies to every aspect of our expedition cruises, including our contacts with local peoples. We are very emphatic that our M/Y Tucano team, both staff and travelers, never purchase anything at all made with animal products such as fur, feathers, fish scales, porcupine quills, or teeth. When we are near the city we are sometimes approached by local entrepreneurs with sloths, primates, or snakes in hand. Their hope is that we will give them money to photograph these creatures. But our policy is never to give money to anyone with captive animals. These captive creatures have very short lives due to improper care and as a result there is a constant need to replace them with new ones taken from the forest. Also when we visit remote villages we ask travelers never to offer to buy artifacts or animal teeth or claws from local villagers. One reason for this is that the settler would simply kill other animals for trade goods. Another, less obvious reason is that local folks have medicinal or ceremonial purposes for animal parts that may not be clear to us. We are there to look and listen, but not interfere.

One last, but very important, awareness that we an expedition team have is avoiding cultural disruption in the small and traditional communities that we visit. Our voyages do not include any "made for tourism" experiences. There are no visits to a native shaman and no scripted tribal dance re-enactments. We have a commitment not to disturb the traditional cultures that we encounter. Instead, we take special care to present the people and natural history of Amazonia as they really are - without exaggeration or artifice. The places we visit are bizarre enough that there is no need to create make believe activities.

The key to sustainable travel is awareness and conscience. This true story and beauty of the Amazon are found in the authenticity of the experience. Our staff and travelers work together as a team to get the very most out of our adventure into the rainforest while at the same time protecting its wonders.

Environmental and Social Responsibility

We on the Motor Yacht Tucano are part of the communities of both the remote villages we visit and the larger city where our vessel is home ported, Manaus, Brasil. We do our best as members of these communities to share the benefits of tourism as broadly as possible as well as work conscientiously together as responsibly as we can. The M/Y Tucano team has a commitment to positive impacts on the environment and the local community of which we are a part. Sustainability is not just about avoiding negative impacts - sustainable tourism must also have a positive benefit.

The operations of the M/Y Tucano are crafted to both share the economic benefit with the community and to promote conservation of the Amazon rainforest. The basic ways that these goals are sought is through promoting environmental education, providing stable well paid long term employment, by implementing procurement policies that distribute the benefit of ship purchasing, and, importantly, through providing revenue to local communities in a way that places high value on preserving wild rainforest.

Environmental Education

Our commitment to preserving the rainforest environment is borne mostly through support of environmental education as well as engagement with governmental authorities charged with preserving the environment. Our voyages are intensive learning experiences, but not just for the travelers. Our goal of environmental education includes our staff and everyone involved with our expedition voyages from equipment suppliers to the local peoples we encounter deep in the remote forest. Through our own conscientious conduct and through careful, thoughtful analysis of the beauties and wonders of the Amazon forest, we hope that everyone with whom we are associated also understands the necessity of preserving this great wilderness. In the nearly three decades of conducting Amazon expeditions we have seen this conscientiousness grow within our communities to become a shared mission and an expression of enduring pride.

Supporting Cultural Preservation

On our cruises we are very careful in our interaction with local peoples and to avoid turning the villagers into trinket vendors or cultural reenactors. We have elaborate procedures in place for not disturbing small communities with our visits. This includes varying the places we visit and ensuring that the interactions with local peoples are respectful and not economically or culturally disruptive. We provide materials that can benefit not just individuals, but the entire community such as diesel fuel for the generator or writing materials to the village school.

Community Support

Our cruise supply and maintenance purchases are quite considerable and we do our best to purchase directly from the local farmer at the farmer's markets. There is a significant multiplier effect of revenue from our vessel operations. Because we are ourselves locally based, virtually all of our activities have social and economic benefits to local people. We especially support sustainable tourism through employment and careful and considered purchasing for our expedition cruises. All of our staff members are licensed by the Brazilian maritime and tourism authorities. While many tourism enterprises hire part time, free-lance guides, all of our staff are long term employees. They are skilled naturalists and mariners and their enthusiasm for communicating their knowledge of the forest, as well as promoting sustainability, are the most important aspects in the success of our cruises. Almost all of our crew members have all grown up in the forest and have a vast store of experience to share with our travelers. Everyone on the M/Y Tucano team shares in the benefits of long term employment and receives comprehensive health care, paid vacation time, retirement accounts, and a variety of other benefits that demonstrate our collective commitment to working together as a team for sustainable forest preservation.