recognize that photographers and divemasters working for them are the worst buddies. But if a diver gets buddied up in that situation, he's got to take responsibility to hang close by since the photographer's subject is obviously far more important than other divers in the water.

We also received word of several incidents where a diver tried to help another diver in distress, resulting in a serious increase in risk. One case came from Watt Hinson (Bay City, TX) during a dive at Cozumel's Las Palmas reef. At 55 feet, he saw another diver's tank slipping out of her BC bands. She removed her BC and in doing so dropped a small, cheap camera that floated down current. The diver then dumped her regulator and swam for the camera but because her BC was weight integrated, she immediately became positively buoyant. "I was able to grab her fin and pass her my primary second stage. Because she was so buoyant, I was unable to hold her on the bottom so we both made an uncontrolled ascent. Fortunately, we didn't sustain injury."

Finally, Paul Gmelch (Amelia Island, FL), though not at risk himself, told us of a dive buddy who was the proverbial accident waiting to happen. "On a recent dive trip, he stopped taking his blood pressure medication, and dove with a dead battery on his wireless transmitter, hence no pressure gauge. On the next dive, he hit his tank on the boat deck while entering and became an inattentive diver with a new camera in his hand. Lastly, while getting out of the water, he gave his fins and camera to the boathand, then fell back in. Enough?" So divers, if there's one lesson to be learned here, it's to dive defensively.

Calculate Your Carbon Fin-Print

Can you go diving and still be eco-friendly?

How eco-friendly is diving? Sure, we love the sea and its creatures, and we want to support healthy coral reefs, but we humans are big contributors to global warming and that's killing the reefs. Considering what goes into a dive trip, are we the best stewards of the environment?

We take advantage of cheap flights to dive in exotic locations, but air travel is the biggest contributor to carbon emissions. The gear we use is manufactured in Third World countries with poor environmental records, then shipped halfway around the world. Airplanes annually produce about 3.5 percent of the world's human-generated carbon dioxide, the greenhouse gas most responsible for climate change. Jet travel, combined with emissions from cars and factories, are major contributors to global warming and rising seas. And the dive boats we ride in burn gallons galore of fuel.

That's leading some concerned citizens – and divers -- to determine their "carbon footprint," using Internet calculators to determine their share of travel- and home-based carbon-dioxide emissions, then paying to "offset" the damage they help create by sending money to organizations that reduce greenhouse gases. Still to be determined is whether carbon offsets will truly help the environment or merely salve the consciences of people who don't want to give up big cars, jet travel and air-conditioning at the touch of a button.

But some dive businesses, recognizing that healthy oceans are integral to profits, are taking steps to reduce their carbon emissions, or paying to offset their carbon footprints.

Explorer Ventures, which has five liveaboards, claims it's the first "carbon neutral" fleet. CEO Clay McCardell said his staff analyzed how much carbon dioxide they emitted through boat diesel burned, utility bills, even employee commutes. Then they calculated what it would cost to offset those emissions, and paid that amount to NativeEnergy, a carbon-offset marketer that funds renewable energy projects. McCardell says he's gotten flack from some in the dive industry about carbon credit purchases. "We couldn't find anything that directly affects the marine environment but we are looking for projects that have a more direct environment. The bottom line: It can't hurt and it can very possibly help." Among other liveaboard fleets, Aggressor plans to upgrade to more energy-efficient engines while Peter Hughes is testing biofuel.

> ***Explorer Ventures claims it's the first "carbon neutral" fleet***

Eco-dive tour operator Beautiful Oceans is thinking of charging divers an extra fee for the carbon offset of their flights and dives, and sending that money to Sustainable Travel International to fund emission-reducing projects. Ocean First Divers, a dive shop in Boulder, Colorado, added a carbon calculator to its Web site so customers can see the dollar figure on carbon credits from their dive travels. Ocean First asks them to buy credits for their emissions to fund renewable energy programs. Owner Graham Casden says he's still deciding whether credits from his sponsored dive trips should be paid by customers, Ocean First, or in a 50/50 split.

Dive Key West upgraded its boat engines to be more fuel efficient. "Our fuel savings is $35 per engine, and the engines don't smoke," says owner Bob Holston. "We're also

trying to get biodiesel but the typical order must be in hundreds of gallons."

It also trickles down to dive clubs. The Holborn Dive Club in London asks members to travel together to dive sites, participate in at least one marine survey annually, and forge long-term relationships in overseas diving destinations by funding or participating in environmental initiatives for that country.

Holston is on the board of the Marine Sanctuary Program, which is working with dive organizations and the U.S. government to create a sustainable-practices program for educating dive shops and divers. The program will debut at DEMA's annual trade show in November. "The U.S. is not as far along as Europe in sustainable practices," Holston says. "But unless we take care of the environment, our industry will disappear."

Should You Fund Trees, Energy or Iron Dust?

Many organizations offer online "carbon calculators" – you can calculate your emissions from flying, driving and daily routines, and cleanse your environmental sins by paying for your emissions with a mouse click.

Sustainable Travel International, a carbon-offsetting middleman, is working with dive operators and shops to install carbon calculators on their Web sites and create diver-education programs. "We're seeing the industry starting to embrace action, but we've only talked to a fraction of the dive businesses so far," says STI president Brian Mullis. They're either building the cost of carbon offsets into their pricing or allowing divers to voluntarily participate. "We encourage them to inform customers that it's clearly in divers' and the industry's best interests to take a pro-active stance to global change."

One STI client is Dive Frontiers in Grand Cayman, which created a carbon-offset calculator specifically for dive travel. "Besides air and land travel, it also calculates energy consumption on a per-dive basis," says Steve Broadbelt, Dive Frontiers' co-founder. It created the calculator by monitoring boat fuel and comparing it to how many dives were made and tanks were filled, then looking at its electricity and water consumption. For example, the calculator figures that a couple of divers on a round-trip flight from New York to Grand Cayman are responsible for the emission of 5.76 tons of carbon dioxide, while 14 dives during a one-week-trip generate an additional 0.26 tons. To compensate for all the carbon generated during their diving vacation, the conscientious couple could donate $91.80 to carbon-offset projects.

"What surprised me was how inexpensive credits are, based on the cost of an average trip," says Broadbelt. "Ten dives

Breathing Exercises For Longer Dive Time

Last April, we reported a study about divers doing certain breathing exercises for 30 minutes daily that increased their dive time by 66 percent and decreased their underwater breathing frequency by 23 percent. Many readers, tired of burning through tanks too fast, asked us to describe those exercises, but unfortunately they can't be replicated at home. "We tested them on a specially built machine, but it's not available for purchase," lead researcher Claes E.G. Lundgren told *Undercurrent*. "And if you try to breathe as intensively for 30 minutes while sitting at home, you'll just get very dizzy."

But there are simple ways to expand your breathing capacity. First, you must change the entire way you breathe, says Michael Grant White, founder of the Optimal Breathing School in Charlotte, North Carolina, and a diver. "Most people inhale only using their chest muscles, which wastes a lot of the oxygen. You need to breathe with your whole body."

Breathing with your belly and strengthening your diaphragm are key, he told *Undercurrent*. "You must train your diaphragm to push more air out on the exhale, otherwise you won't inhale the needed volume of air into your lungs. Your belly must expand on exhalation and relax during inhalation so the diaphragm can move downward with less force and less energy expenditure." This will help you breath slower too and pump blood more efficiently.

One of White's exercises to build up the diaphragm is the "Squeeze and Breathe." Sit up straight near the edge of a hard chair with feet flat on the floor. Relax your jaw and stomach. Place your thumbs over your kidneys and wrap your fingers around your sides toward your belly button as if you were getting a grip on your love handles. Squeeze fingers and thumbs together gently but firmly. Then inhale through your nose in a deep three-second breath, using the force to widen your fingers and thumbs against their attempt to stay tensely closed. Then relax your grip and, keeping your belly stomach relaxed, slow down your exhale so it lasts seven seconds. Gradually work up to 20 counts of a three-count inhalation and a seven-count exhalation.

You can also turn to Dennis Lewis's *Tao of Natural Breathing*, a book with diaphragm-building exercises. But forget breathing machines, with names like PowerLung and SportsBreathe. Experts say they're no good for building up the diaphragm. And pumping iron won't do the trick. "Bodybuilding actually restricts lung capacity because it builds up the external muscles around the diaphragm, giving it less room to expand," says White.

A few minutes a day building up deep-diaphragm breathing can increase underwater time by minutes. White says divers have it better than land-based athletes. "Because most of a diver's exertion is done in a gravity-free environment, he can have greater lung capacity than a Mr. Universe."

only cost $3." His dive calculator is available for all dive businesses to use by paying STI an annual $200 fee. Although Dive Frontiers doesn't charge offset fees to divers upfront, it may reevaluate. "We're not getting any negative feedback, but it is more of a mindset issue to get divers to change their minds."

Buying offsets may assuage guilt, but does it work? The answer is "maybe." According to Ricardo Bayon, director of green research firm Ecosystem Marketplace, "There are no widely accepted standards for what qualifies as an offset. Almost anyone can sell you anything and claim it will make you carbon neutral."

Take tree plantations, which accounts for most voluntary offset money. Trees will reabsorb carbon only gradually, in decades. Even successful trees die, rot and yield their carbon. So the result is not negating the emission but timeshifting it. Rather than staying in the atmosphere through this century, that ton of offset carbon will just inhabit the next.

Then there's just-plain-crazy projects. American company Planktos Inc. wants to dump 45 tons of iron dust near the Galapagos Islands. It says iron will stimulate growth of phytoplankton, which would absorb large amounts of carbon dioxide. Planktos will then sell carbon credits from the iron dump to companies. The U.S. Environmental Protection Agency, the Galapagos National Park and worldwide environmentalists say it would lead to toxic algae blooms and choke off the ocean's oxygen supply. Greenpeace plans to send an interceptor ship to block Planktos's vessel.

A good alternative is green energy projects like wind turbines and solar panels. "Funding these is better than forests because it stops pollution rather than contributing to it later, and you're contributing to a wider move away from fossil fuels," says Bayon.

Boats Dive into the Green

On liveaboards, fuel consumption varies based on engine type, boat speed, even weather conditions. Climate Care estimates a small dive boat taking 10 divers out for a day's diving uses 18 gallons of fuel, equaling $1.85 per diver. A larger liveaboard uses seven gallons per hour steaming at seven knots, and two gallons per hour while idling at the site. That calculates to 24 gallons, or $3 per diver per day. New high-speed catamaran-style dive boats may double this amount. The energy used to fill an individual tank is marginal. Carbon Care estimates $3 for every 100 fills. Nitrox and trimixes fills are $7 for every 100 fills.

Earl Meador, operations manager for the Aggressor fleet, wants to install the most fuel-efficient engines recommended by the EPA. The big issue is fuel availability at various ports. "Some eco-engines won't operate with high-sulfur fuels, but some countries, like those in Central America, have a high sulfur content in theirs."

The Peter Hughes operation says its *Sky Dancer* in the Galapagos received kudos from Smart Voyager, a sustainable tourism certifier in South America, for eco-friendly handling of liquid and solid waste, and gas emissions. Larry Speaker, Hughes' vice president, says its *Star Dancer* in Papua New Guinea now runs on palm oil instead of diesel fuel. But reflecting the contradictions of eco-friendly practices, palm oil is now called an eco-nightmare fire by environmentalists because demand for it is causing the clearing of huge tracts of Southeast Asian rainforest and the overuse of chemical fertilizer.

Boat fleets want to be green but say large vessels have a harder time. "There's no affordable alternative to burning fuel, and divers expect air-conditioning, compressed air and the power to charge their electronics, so we're limited based on what we can do," says McCardell.

So what does "think globally, act locally" mean for divers? You're not going to give up diving or stop traveling to do so. Therefore, it's a question of minimizing environmental impact and offsetting the damage. Check some carbon calculators before your next dive trip, evaluate credit marketers to find an honorable one, and consider contributing money to offset your fumes. Another bonus: Your contributions may be tax-deductible. *-- Vanessa Richardson*

Statement of ownership, management, and circulation, as required by U.S. Postal Service 39 U.S.C.3685:1.Title of publication: Undercurrent. 2. Publication number: 1095-1555. 3. Date of Filing: October 1, 2007. 4. Frequency of Issue: Monthly, with the Nov./Dec. issue being the book-sized annual dive guide. 5. Number of issues published annually: 11. 6. Annual subscription price: $99.00. 7. Complete mailing address of known office of publication: Undercurrent, 3020 Bridgeway, Suite 102, Sausalito, CA 94965.8. Complete mailing address of the headquarters of general business offices of the publisher: Undercurrent, 3020 Bridgeway, Suite 102, Sausalito, CA 94965. 9. Full names and complete mailing address publisher and editor: Ben Davison, Publisher and Editor, 3020 Bridgeway, Suite 102, Sausalito, CA 94965. 10: Owner: Undercurrent, a non-profit corporation, 3020 Bridgeway, Suite 102, Sausalito, CA 94965. 11. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities: None. 12. Tax Status: Nonprofit. 13. Publication title: Undercurrent. 14. Issue date for circulation data below: January 2006. 15. Extent and nature of circulation: A. Total number of copies (net press run): Average number of copies each issue during preceding 12 months: 11,000. Actual number of copies of single issue published nearest to filing date: 11,000. B. Paid and/or requested circulation: 10,500. Mail subscription outside county (paid and requested): Average number of copies each issue during preceding 12 months: 10,500. Actual number of copies of single issue published nearest to filing date: 10,500. 2. Mail subscription inside county (paid and requested): Average number of copies each issue during preceding 12 months: none. Actual number of copies of single issue published nearest to filing date: none. 3. Sales through dealers and carriers, street vendors and counter sales: none. Average number of copies each issue during preceding 12 months: none. Actual number of copies of single issue published nearest to filing date: none. 4. Other classes mailed through the USPS: Average number of copies each issue during preceding 12 months: none. Actual number of copies of single issue published nearest to filing date: none. C. Total paid and/or requested circulation: Average number of copies each issue during preceding 12 months: 10,500. Actual number of copies of single issue published nearest to filing date: 10,500. D. Free distribution by mail (samples, complimentary, and other free copies): 1. Outside-county: Average number of copies each issue during preceding 12 months: 44. Actual number of copies of single issue published nearest to filing date: 44. 2. In-county: Average number of copies each issue during preceding 12 months: none. Actual number of copies of single issue published nearest to filing date: none. 3. Other classes: not applicable. E. Free distribution outside the mail: none. F. Total free distribution: Average number of copies each issue during preceding 12 months: 44. Actual number of copies of single issue published nearest to filing date: 44. G. Total distribution: Average number of copies each issue during preceding 12 months: 10,500. Actual number of copies of single issue published nearest to filing date: 10,500. H. Copies not distributed: Average number of copies each issue during preceding 12 months: 456. Actual number of copies of single issue published nearest to filing date: 456. I. Total: Average number of copies each issue during preceding 12 months: 11,000. Actual number of copies of single issue published nearest to filing date: 11,000. J. Percent paid and/or requested circulation: Average number of copies each issue during preceding 12 months: 99%. Actual number of copies of single issue published nearest to filing date: 99%. 16. Publication of Statement of Ownership: October 2007. I certify that the statements made by me above are correct and complete. Ben Davison, Publisher.