Water sucked from ocean deep cherished for goodness, purity

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A mid-January meeting of the Council for Economic Planning and Development (CEPD) adopted a set of guidelines and set up a special task force aimed at promoting research and development (R&D) in a rather incredible new category of economic activity: deep-sea water industries. All of them employ water pumped from ocean depths below 200 meters--which amounts to 95 percent of ocean water--but that is about as far as their similarity goes.

A diversity of uses for the cold, relatively pollution-free, mineral-rich water has been developed since researchers in Japan began studying its uses in 1976, with scientists in Hawaii following suit. The icy water--it can be as cold as 2 degrees Celsius, as compared with surface-layer temperatures ranging from 10-30 degrees Celsius--has been found to be rich in calcium, iron, nitrogen and phosphorus, which are beneficial to the human body.

At relatively shallow depths of seawater, mineral content is much lower than at hundreds or even thousands of meters under the sea, as the profusion of fauna, flora and microbes filters minerals out of the water. By contrast, the freezing temperatures and extremely high pressures of the ocean depths support little life--even bacteria and viruses. And because cold water keeps to lower ocean layers, there is relatively little convection--which is to say, only limited mixing of shallow and deep layers of seawater. Consequently, deep-sea water is relatively clean and germ-free.

This points immediately to what has already become a booming new enterprise--the desalination and marketing of deep-sea water. One company in Hawaii, Koyo USA Corp., is selling as much bottled deep-sea water as it can process. According to a report at the Web site of U.S. Water News, the company's prime market is Japan, where people willingly fork out between US$4 and US$6 for a 1.5-liter bottle of its MaHaLo brand water.

Another obvious use of deep-ocean water is in aquaculture. It is being used in Japan and elsewhere to culture a variety of marine life including salmon, ocean trout and Japanese flounder; abalone and various types of oysters; prawn and shrimp; and various sorts of algae for use in health food products. There is already a large and fast-growing body of scholarly literature on the uses of deep-sea water in oceanic aquaculture.

Because the water has extremely low germ content, it is easier to maintain the animals cultured in it, and its low content of organisms of any type means that the pipes and screens used in aquaculture do not get encrusted and clogged and can go for years without need of cleaning. Cold water from fathoms below can be blended with surface water as needed to maintain just the right temperature for different types of marine life. Moreover, water from a certain depth can be counted on to maintain a stable temperature throughout the year.

The plentiful supply of deep-sea water offers endless possibilities, including the manufacture of a huge variety of foods, medicines, tonics and cosmetics, and the provision of high-class spa bathing services. Experiments are underway for using the water, with its enhanced heat-exchange efficiency, to cool power station equipment.

Studies are also underway to evaluate the feasibility of ocean thermal energy conversion--the use of temperature differences between warm surface seawater and cold deep-sea water to produce electricity.

In Taiwan, use of the water has only recently begun in the beverage industry. In 2002, Hey Song Corporation, a local maker of root beer and other soft drinks, launched the FIN brand deep-sea water

sports metabolite drink. In the first half year, the total production value of the new beverage amounted to more than US$3.2 million.

Taking note of the growing popularity of deep-sea water products and services, Taiwan's state-run Industrial Technology Research Institute (ITRI) turned its know-how to designing a high-pressure pump that, in a successful test, sucked about two metric tons of deep-sea water from 300 meters beneath the surface of the very deep ocean off the coast of eastern Taiwan's Hualien and Taitung counties.

An associated research report, released in mid-2004 noted that the water temperature at that depth ranged from 10 to 13 degrees Celsius. The amount of nutritious salt and minerals is three to 10 times that contained in surface sea water. The degree of clarity of the water sucked from that level--measured in "nephelometric turbidity units" (NTU)--was 0.3 NTU, whereas turbidity becomes noticeable to the average person only at about 5.0 NTU.

The ITRI is also developing thin-film filtration technology to desalinate seawater and produce high-quality drinking water, while at the same time harvesting salt crystals good for industrial and household applications.

In consideration of Taitung County's fortuitous location beside a deep ocean abyss, and aware of the profound possibilities offered by its cold treasure, the Taitung County Government has begun to solicit assistance from the central government for the establishment of a deep-sea water science park, which would combine R&D with tourism. Citing the annual production value of US$2.5 billion in the first year of operation of a counterpart in Japan--one of only two in the world, the other one in Hawaii--County Magistrate Hsu Ching-yuan has expressed his hope that the government will expedite the planning of the world's third deep-sea water science park in Taitung, which already has a reputation of being graced by relatively unspoiled natural splendor.

The county government has also begun to look for investors on its own. In August 2004, it floated a plan to prospective investors whereby the science park would be constructed on a build-operate-transfer basis. To date, Taiwan Fertilizer Co. Ltd. and Kuo Toong International Co. Ltd., a firm specializing in manufacture of water-supply equipment, have shown strong interest in the project.