Allianz Global Investors White Paper Series

Water: A Key 21st-Century Growth Opportunity

Executive Summary

While water is part of our everyday lives, it is less frequently part of our investment portfolios. Yet water is rapidly becoming the oil of the 21st century. With an expanding world population, the massive urbanization of developing nations and overstressed infrastructure, the global need for fresh water is set to grow exponentially over the coming decades. We believe that innovative companies specializing in water technologies—from delivery systems to desalination plants to wastewater management—could represent some of the world's biggest capital-growth opportunities in the coming years.

Table of Contents

Global water demand will be pushed 40% beyond accessible, reliable supply by 2030 unless significant headway is made toward resolving the global water crisis

Fresh, clean water has no substitute. Other commodities have surrogates—wheat for oats, coal for natural gas—but water does not.

As a result, the global demand for water—especially in developing nations—will continue to grow dramatically as the world's population expands, bringing greater urbanization, industrialization and agricultural needs. At the same time, the supply of water is finite; it is a limited and precious resource that is threatened not only by excess demand, but by climate change and pollution. With global demand in 2030 expected to exceed currently available water supplies by 40%, we are on an unsustainable path of inaction toward solving the problems created by the supply/demand imbalance.[1]

Yet while water is free, at least in theory, the delivery and treatment of water comes at a cost. As we will demonstrate, we believe proactive investment on local and global levels is the best way to find solutions to some of the world's biggest water-related challenges. Even as developing countries need to build water infrastructure to sustain growth and development, developed nations must repair and extend their aging water infrastructure. The good news is that the work ahead—and certainly the projects already underway—offers numerous opportunities for investors to solve a critical global problem.

Allianz Global Investors

Growing Demand and a Finite Supply

For perspective on the finite supply of water, consider that 97.5% of the world's water lies in saltwater oceans. Just 2.5% of the global water supply is fresh and much of it is inaccessible: Most of the world's fresh water is frozen in glaciers and polar ice caps, while much of the rest is deep underground (see **Exhibit 1**).

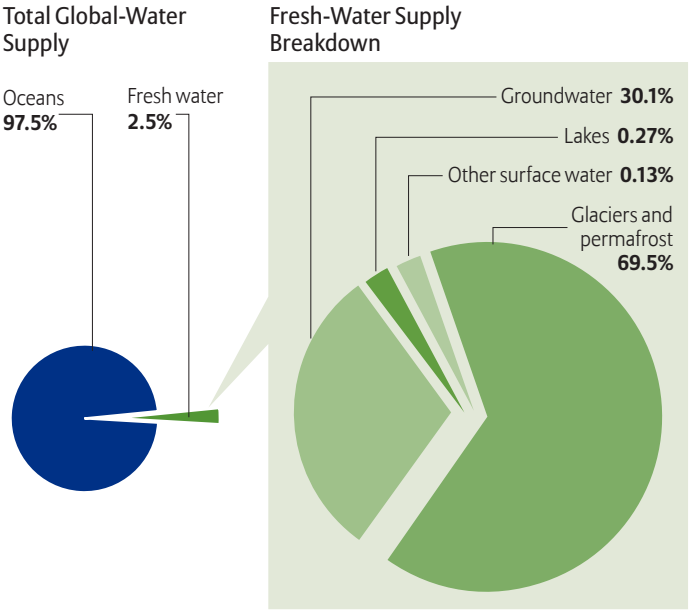
Only about 0.5% of all the water in the world—the fresh water in groundwater, lakes and surface supplies—is available for residential, agricultural and industrial uses. But fresh water generally requires additional processing and filtration to make it drinkable, which is why only a small percentage of the world's accessible fresh water—about 0.007% of the global water supply—is "potable," or safe for consumption.[2]

At the same time, demand for water is growing:

- Water use for human purposes, including industrial development and increased irrigation, grew by 600% during the 20th century—approximately twice the rate of the world's already explosive population growth.[3,4]
- In 2001, 54% of the world's fresh water was used annually, primarily for agriculture. By 2025, population growth could push that number to 70%—and it may reach 90% if global per capita consumption reaches the levels in today's developed countries.[3]

Exhibit 1: Fresh Water: A Precious Commodity

Compared with the world's total supply of water, fresh water is a relatively rare resource.



Sources: Shiklomanov and Rodda, 2003, Bank of America SRI Report Sept. 2011, World Bank.

Among the trends causing demand to skyrocket are industrialization, shifts in agriculture, ongoing urbanization, population growth, changes in rainfall patterns and a global decrease in water quality due to pollution. Below are some of the key water-related issues that we believe are at the core of these trend-driven global challenges.

Industrial usage

Most industries require a reliable supply of raw or purified water, which is why industrial activity accounts for approximately 20% of global water consumption.[5]

As the rate of industrialization grows, especially in emerging nations, existing water supplies may not be replenished quickly enough to meet demands. A greater supply of water will be needed given the industrial-growth aspirations of Asia, Africa and Latin America, as well as the increasing importance of water-intensive industrial sectors such as shale-gas drilling, energy generation and mining.

Agriculture

Farming in general is water-intensive—about 70% of global water consumption goes to agriculture—but recent trends have further increased demand.[5]

- **A growing middle class:** An expanding emerging-market middle class and a consequent rise in real income have decreased subsistence-based diets and increased the demand for protein. As shown in Exhibit 2, poultry and cattle farming consume significantly more water than vegetable farming.
- **Global warming:** Climate change has led to more unpredictable rainfall patterns, less availability of fertile land globally and a growing threat of droughts.

Urbanization

If cities lack sufficient water supplies to accommodate their growing populations, other water resources must be diverted—requiring the drilling of deeper wells and the creation of additional desalination plants.

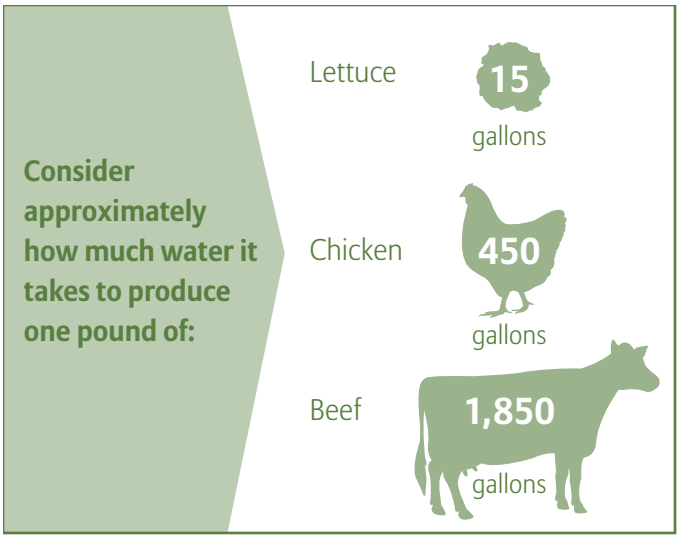
Population growth

An estimated 90% of the 3 billion people expected to be added to the world's population by 2050 will be in developing countries—many living in regions where the current population does not have sustainable access to safe drinking water and already experiences water stress.[4]

Pollution

In the developing world, about 75% of industrial waste and 90%–95% of sewage is discharged directly into rivers, lakes and coastal waters without treatment, contaminating the already dwindling water supply.[6] In China, 80% of rivers are too toxic for fish, while water withdrawal from the Yellow River has led to a drop in agricultural production.[7]

Exhibit 2: Water Usage Increases Exponentially in Protein-Based Diets
Large quantities of water are required to produce chicken and beef, which are in high demand from an expanding middle class in emerging markets.



Source: Water Footprint Network.

A Growing Need for Increased Infrastructure Investment

On the sliding scale of supply/demand imbalances for water, the UN has defined several key points of concern: water shortage, water stress, water scarcity and absolute water scarcity. Of these imbalances, water scarcity is perhaps one of the biggest problems facing the 21st-century world—creating a need for action and an opportunity for investment.

Water scarcity: An excess of water demand over available supply

Simply put, water scarcity occurs when demand for fresh water exceeds supply in a specific area. It is a relative term that can arise from any level of supply or demand—and it is both a natural and a human-made phenomenon. According to the UN: "There is enough fresh water on the planet for 6 billion people, but it is distributed unevenly and too much of it is wasted, polluted and unsustainably managed."

With water scarcity already a crisis in some regions and growing steadily worse in others, we believe it can best be addressed by making investments in either supply-enhancing or demand-reducing technologies. Our research has determined that water scarcity is a function not only of regional supply shortfalls, but of insufficient investments in water infrastructure and a historically late response to changing water-demand trends. Consider some of the following infrastructure challenges and opportunities.

Infrastructure investment is essential

According to a joint initiative of the Global Water Partnership, the World Water Council and the Third World Water Forum in Kyoto, Japan, "there is widespread agreement that the flow of funds for water infrastructure has to roughly double, and the increase will have to come from all sources." In fact, the World Water Council estimates that between 2001 and 2025, spending will have to increase to about $180 billion annually, with much of the growth needed for household sanitation, wastewater treatment, treatment of industrial effluents, irrigation and multipurpose schemes.[8]

US infrastructure earned a "D+" grade in 2013

It is also important to note that water infrastructure is a global problem. While many of the trends we've outlined above point to a need for increased investment in emerging-market water infrastructure to alleviate supply/demand imbalances and provide sustainable access to safe drinking water, developed nations also have challenges. In the US alone, the Environmental Protection Agency (EPA) estimates that water systems will need more than $275 billion in investments between 2003 and 2023. In addition, the American Society of Civil Engineers in 2013 gave the United States a "D+" grade for overall infrastructure, with individual water-related infrastructure areas all receiving "D" or lower grades.

The necessity of local delivery

Water is heavy and provides a breeding ground for bacteria, which can lead to contamination over time. That makes transporting water in pipes over vast distances uneconomical, unsanitary or even impossible, which is why one region's water scarcity cannot easily be mitigated using another region's resources. Instead, each region needs to address its own water shortages individually by increasing accessibility to existing supplies, reducing demand, prioritizing usage or increasing efficiency.

Massive government spending on the horizon

In the coming years, the world's governments will have to devote significant resources to managing demand and facilitating access to water, setting fair and affordable pricing, controlling pollution and ensuring sustainability. These projects are projected to grow an average of 5%–8% annually, and to increase the current $500 million water market to $1 trillion by 2020.[9]

Water may be a $1 trillion market by 2020

Increasing privatization

Although the public sector currently rules the water industry in most of the world—with annual water investment needs expected to rise to more than $770 billion for BRICS* and OECD† countries by 2015—and with public funding already under substantial financial pressure, it's likely that the private sector will play a greater role in funding water investments.[9] Europe has already started to make the transition into privatization of water management, and the majority of services for the UK and France are handled by private operators. We believe this trend is likely to continue globally, which will have significant implications for the investment landscape.

Water Is a Compelling Business Model

Because of global population growth, demand for clean, fresh water continues to increase—unaffected by economic conditions, political developments or ever-changing consumer preferences. We view the sector as a long-term investment opportunity that has historically offered stable, consistent returns and can serve as an alternative to low-yielding bonds and volatile equity markets.

Drivers of water investing

Given the scale of the global water problem, and the fact that water infrastructure is extremely costly and capital intensive, and requires years of careful planning, it is not surprising that water is increasingly viewed as a core commodity that is potentially as profitable as oil. We have identified three main drivers of opportunities in the water space (see **Exhibit 3**).

Consistent long-term growth potential

Water investing has the potential to offer strong, long-term, consistent growth potential in a wide range of market or economic environments.

- Since its inception, the S&P Global Water Index has grown by almost 240% and has outperformed broader equity-market indexes—including the S&P 500 Index, which it beat by 7.5% on an annualized basis from 11/2001 to 12/2012 (see **Exhibit 4)**.
- The water segment has historically provided an attractive risk/reward profile when compared to more traditional asset classes, offering significant income potential and volatility that is in line with, or less than, other equity indexes (see **Exhibit 5**).

Exhibit 3: Three Drivers Behind Water Investments

Billions or even trillions of dollars will be needed to develop technologies that improve the supply, efficiency and quality of water.

Area of Development	Solution	Opportunity
1. Expanding the water supply **Why?** 1.1 billion people have inadequate access to water[2]	Develop new water infrastructure to create a sustainable, reliable and cost-efficient supply system for developed and developing nations	■ Exploration costs, engineering and design ■ Well drilling ■ Runoff water-capturing facilities ■ Pumping stations and pipelines ■ Desalination equipment ■ Wastewater treatment plants for reuse or discharge ■ Construction materials
2. Increasing water-supply efficiency **Why?** 32 billion cubic meters of treated water is leaked from water-supply systems every day[10]	Create effective solutions to reduce demand, lessen the need for capital-intensive solutions and promote sustainable use of available resources	■ Irrigation equipment to prevent evaporation of water in farming ■ Meters to stop waste ■ Drought-resistant crops or fertilizers ■ Automation controls ■ Leakage detection
3. Improving water quality **Why?** 80% of China's rivers are too toxic for fish—let alone human consumption[7]	Increase regulations on drinking-water quality and establish minimum levels of treatment	■ Filtration ■ Monitoring and testing ■ Disinfection chemicals ■ Sanitary appliances ■ Wastewater technology

Source: Allianz Global Investors.

* Brazil, Russia, India, China, South Africa
† Organisation for Economic Co-operation and Development

A dynamic, diversified asset class

Contrary to the belief held by some investors and market-watchers, the water segment is not limited to water utilities, but is instead diversified across a number of industries and regions. The S&P Global Water Index is composed of 50 of the largest publicly traded companies in water-related businesses in both developed and emerging markets. Moreover, with the index's maximum company allocation of 10%, no single company dominates the space.

The case for active management

While passive exchange-traded funds (ETFs) are gaining acceptance as efficient ways to access many asset classes, we do not believe they are the optimal vehicle for water investing. Because water resources cannot be invested in directly, it is important to identify companies that have growing exposure to investments in water infrastructure. As such, we believe a forward-looking selection process is essential. Companies should be picked with a global perspective from all subsegments along the supply chain, and each should have a high degree of current and promising water-related revenue streams.

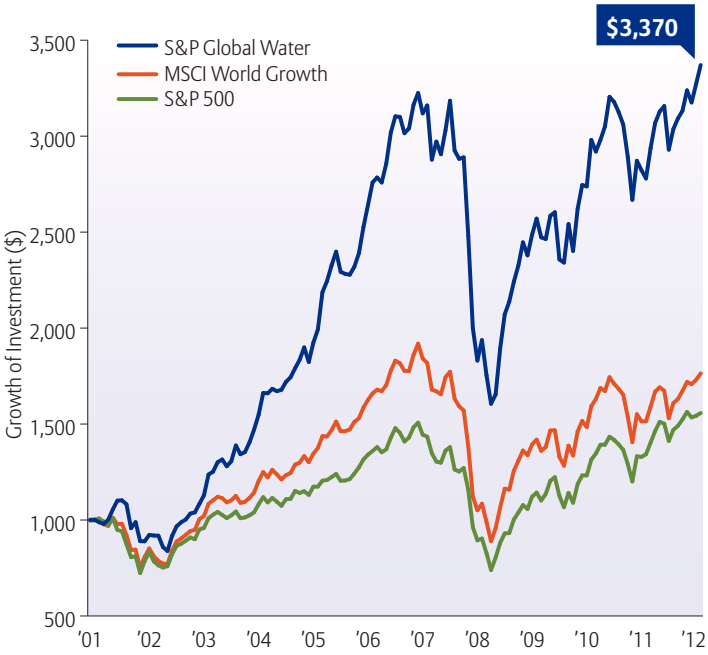
ETFs are likely to hold the largest, most liquid and most recent issuers in an index, and thus are unlikely to react quickly to new developments and changing opportunities. ETFs are backward-looking, and are rebalanced based on the previous year's results. Of course, passive investing may involve lower fees and expenses, and it is possible for active portfolio managers to negatively affect portfolio performance with their stock selections. But active managers of water investment portfolios can provide investors with distinct benefits versus passive ETFs.

Unlike passive ETFs, active managers may:

- **Be proactive**, taking a strategic view of the issues facing and shaping the industry. They can seek out companies where new promising trends may be emerging, instead of being limited to an index's holdings.
- **Exercise flexibility** to invest beyond "pure-play" water companies, in which the main focus of the company's business activity is water-themed, to companies that are not directly associated with water-related activities. One example of the latter might be a company that manufactures pipelines for the conveyance of water. Such an approach can help to diversify a water portfolio and possibly reduce its risk.

Exhibit 4: Water Has Outperformed the Broader Equity Markets

A hypothetical $1,000 investment in the S&P Global Water Index at inception would have grown to $3,370 as of 12/31/12.

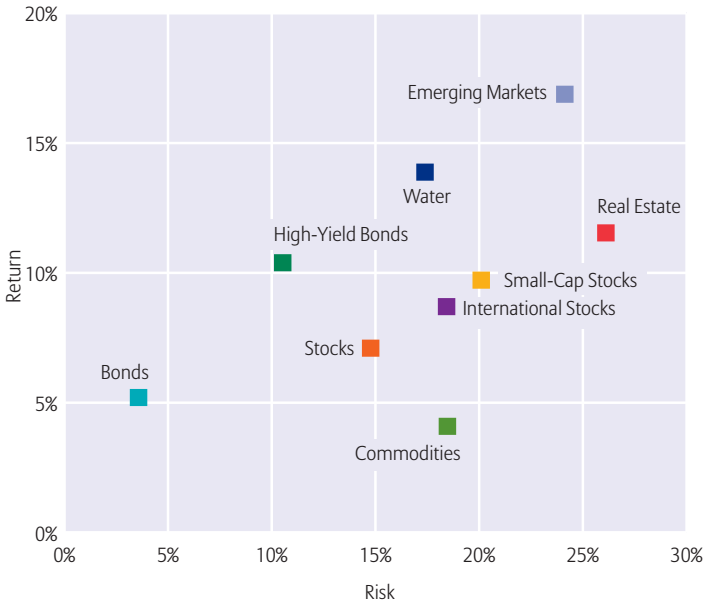


11/2001–12/2012	Annualized Returns
S&P Global Water	11.54%
MSCI World Growth	5.23%
S&P 500	4.06%

Source: Morningstar Direct. Data as of 12/31/12. **Past performance is no guarantee of future results.**

Exhibit 5: Water Boasts a Favorable Risk/Reward Profile

Over a 10-year period, water has provided significantly higher returns than stocks and bonds, with less volatility than most traditional equity indexes.



Sources: FactSet, Morningstar, Allianz Global Investors. Data from 1/03–12/12. Stocks are represented by the S&P 500 Index, small-cap stocks by the Russell 2000 Index, international stocks by the MSCI EAFE Index, bonds by the BofA Merrill Lynch US Broad Market Bond Index, water by the S&P Global Water Index, commodities by the DJ UBS Commodity Index, real estate by the US NAREIT Index, emerging markets by the MSCI Emerging Markets Index and high-yield bonds by the BofA Merrill Lynch US High Yield Index. **Past performance is no guarantee of future results.**

- **Assess relevance** and remove holdings that are in decline because of obsolete technologies or dated business models.
- **Provide diversification** between sectors and companies, instead of seeking to replicate an index. However, diversification does not assure a profit or protect against a loss.

While water is a long-term stable-growth theme, investing in water companies is not free from volatility. Because water is so vital for sustaining life, water companies can be significantly affected by changes in conservation trends, tax and governmental regulations, and international or regional political and economic developments. Furthermore, some companies in water-related businesses may be potential takeover targets, and the effects of mergers and acquisitions must be part of any investment decision.

For these reasons, we believe it is important for potential water investors to look for a diverse portfolio led by an active investment team with environmental investment experience, a large research platform and deep knowledge about sustainability, strategy and implementation.

How water fits in an asset allocation strategy

The water sector is primarily composed of equity securities and has high correlations with traditional equity investment categories, such as US large-cap equity, international equity and global equity (see **Exhibit 6**). As a result, we recommend that investors use a portion of their overall equity allocation to complement core US and international equity holdings with water investing—a strategic position that potentially offers an incrementally higher return with slightly higher expected risk.

As part of a broad equity allocation, water investing does offer modest diversification benefits; although its correlations with other equity segments are reasonably high, they are not perfectly correlated.* But despite the equity-only nature of water investing, water-related stocks do provide diversification benefits, as they can be affected by specific factors, many of which do not affect other sectors (e.g., changes in environmental law or government regulation, weather events such as droughts and hurricanes, etc.).

Based on an investor's risk tolerance, time horizon and existing allocations, we believe a sensible allocation to water-related investments in an overall portfolio would range from 2.5%–5%.

Exhibit 6: The Water Sector Provides a Strong Complement to a Core Equity Allocation

Strategically allocating to water investments within an overall equity position may offer an incrementally higher return thanks to the sector's reasonably high correlation with traditional equity segments.

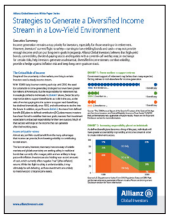
Correlation Table									
1/2003–12/2012	S&P 500	Russell 2000	MSCI EAFE	BofA ML US Broad Market Bond	S&P Global Water	DJ UBS Commodity	US NAREIT	MSCI Emerging Markets	BofA ML US High Yield
Investment Name	1	2	3	4	5	6	7	8	9
S&P 500	1.00								
Russell 2000	0.92	1.00							
MSCI EAFE	0.90	0.82	1.00						
BofA ML US Broad Market Bond	0.04	-0.05	0.10	1.00					
S&P Global Water	0.89	0.85	0.93	0.08	1.00				
DJ UBS Commodity	0.49	0.42	0.60	0.08	0.55	1.00			
US NAREIT	0.77	0.80	0.69	0.17	0.71	0.32	1.00		
MSCI Emerging Markets	0.82	0.77	0.90	0.10	0.87	0.63	0.61	1.00	
BofA ML US High Yield	0.73	0.68	0.74	0.24	0.72	0.45	0.71	0.72	1.00

Source: FactSet, Morningstar, Allianz Global Investors. Data from 1/03–12/12.

* Correlation is a statistical measure of how two securities move in relation to each other.

Access Our Other Insightful White Papers

Today's global investment landscape is more complex than ever before. To stay ahead of the curve, investors need cutting-edge, expert analysis of the trends shaping today's markets. That's why we are dedicated to providing tools to help you make the most informed investment decisions possible.



Strategies to Generate a Diversified Income Stream in a Low-Yield Environment | High-yield bonds, convertibles, dividend-paying stocks and equities with a covered-call overlay may help investors generate a substantial diversified income stream, combat volatility and provide a hedge against rising interest rates.

The Evolution of High-Yield Bonds into a Vital Asset Class | With high-quality bond yields near all-time lows, investors have been pouring into high-yield bonds at a record pace. Although this has fueled concerns about an overheated high-yield market, we believe investors would be better served by thinking of high-yield bonds as more of a strategic allocation for the long term than a tactical allocation for today.

The Fiduciary Considerations of Selecting the Right Target-Date Fund for Your Plan | Market gyrations in recent years highlighted an important fact: Not all target-date funds are created equal. In fact, target-date funds can differ in very significant ways, from their underlying investment strategies to their fee structures. As target-date fund offerings continue to expand, and as their popularity with plans and participants grows, it is essential that the plan fiduciary understands these differences and considers them as part of a prudent selection process.

Managing Tail Risk | Tail risk is the possibility that unusual events will occur and cause negative consequences. It often occurs faster and more often than predicted, requiring investors to take preventative action. This white paper examines the causes of fat-tailed market outcomes, addresses common misconceptions about "normal" market returns" and discusses three rules for managing tail risk in investment portfolios—specifically within qualified default investment alternatives (QDIAs).

Short-Duration High-Yield Bonds: An Attractive Solution for a Low-Yield Rising-Rate Environment | Income generation remains a primary concern for many investors, but historically low-yielding Treasuries aren't providing sufficient income—and they leave investors exposed to potential price depreciation from rising interest rates. High-quality short-duration high-yield bonds provide much-needed income, have held up well in rising-rate environments and can help reduce volatility without a significant drop in yield.

More Perspective on the Target-Date "To-Versus-Through" Choice | In recent years, one of the most frequent debates about target-date funds (TDFs) has been whether TDFs should be managed "to" or "through" the target date. In this paper, Target Date Analytics LLC aims to bring clarity to that question—and in the process examines the underlying assumptions in the to/through distinction to provide plan sponsors and their advisors with firm ground from which to make informed TDF decisions.

EMU Debt Crisis | The European debt crisis has been roiling global markets for more than three years. Progress has been made, but further steps are required to reach resolution. This paper explores those steps and how we see events evolving into our baseline scenario of a more integrated monetary union.

To access these white papers, visit **us.allianzgi.com.**

Endnotes:

1. 2030 Water Resources Group
2. World Health Organization
3. *Footprints and Milestones: Population and Environmental Change, The State of World Population 2001,* United Nations Population Fund
4. United Nations
5. Shiklomanov and Rodda, 2003, Bank of America SRI Report, Sept. 2011, World Bank
6. *"Solutions for a water-short world,"* Hinrichsen, D., Robey, B., and Upadhyay, U.D. Population Reports, Series M, No. 14. Johns Hopkins School of Public Health, Population Information Program, Dec. 1997
7. UNDP Human Development Report; Beyond scarcity: Power, poverty and the global water crisis, Nov. 9, 2006
8. Financing Water for All: Report of the World Panel on Financing Global Water Infrastructure, World Water Council, 2001
9. BofA Merrill Lynch
10. World Bank

About Allianz Global Investors

Allianz Global Investors is a diversified active investment manager with a strong parent company and a culture of risk management. With 23 offices in 18 countries, we provide global investment and research capabilities with consultative local delivery. We have $405 billion in AUM for individuals, families and institutions worldwide and employ over 500 investment professionals.*

At Allianz Global Investors, we follow a two-word philosophy: Understand. Act. It describes how we look at the world and how we behave. We aim to stand out as the investment partner our clients trust by listening closely to understand their challenges, then acting decisively to provide them with solutions that meet their needs.

*Combined worldwide assets as of March 31, 2013.

Investors should consider the investment objectives, risks, charges and expenses of a Fund carefully before investing. This and other information is contained in the Fund's prospectus or summary prospectus, which may be obtained from your financial advisor. Please read the prospectus carefully before investing.

Past performance is no guarantee of future results. This is not an offer or solicitation for the purchase or sale of any financial instrument. It is presented only to provide information on investment strategies and opportunities. The material contains the current opinions of the author, which are subject to change without notice. Statements concerning financial market trends are based on current market conditions, which will fluctuate. References to specific securities and issuers are for illustrative purposes only and are not intended to be, and should not be interpreted as, recommendations to purchase or sell such securities. All data as of 12/31/12 unless otherwise noted.

A Word About Risk: Investing in a limited number of issuers or sectors may increase risk and volatility. Investing in the water-related resource sector may be significantly affected by events relating to international political and economic developments, water conservation, the success of exploration projects, commodity prices and tax and other government regulations. Foreign markets may be more volatile, less liquid, less transparent and subject to less oversight, and values may fluctuate with currency exchange rates; these risks may be greater in emerging markets. Derivative prices depend on the performance of an underlying asset; derivatives carry market, credit and liquidity risk.

Correlation is a statistical measure of how two securities move in relation to each other. Correlation is computed into what is known as the correlation coefficient, which ranges between -1 and +1. Perfect positive correlation (a correlation coefficient of +1) implies that as one security moves, either up or down, the other security will move in lockstep, in the same direction. Alternatively, perfect negative correlation means that if one security moves in either direction the security that is perfectly negatively correlated will move by an equal amount in the opposite direction. If the correlation is 0, the movement of the securities is said to have no correlation, it is completely random.

The Standard & Poor's 500 Composite Index (S&P 500) is an unmanaged index that is generally representative of the US stock market. The Standard & Poor's Global Water Index is composed of 50 of the largest publicly traded companies in water-related businesses that meet specific investability requirements. The index is designed to provide liquid exposure to the leading publicly listed companies in the global water industry, from both developed markets and emerging markets. The Russell 2000 Index is an unmanaged index that consists of the 2,000 smallest companies in the Russell 3000 Index and represents approximately 10% of the total market capitalization of the Russell 3000. It is generally considered representative of the small-cap market. The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets. The MSCI Europe Australasia Far East (MSCI EAFE) Index is a widely recognized, unmanaged index of issuers located in the countries of Europe, Australia and the Far East. MSCI World Growth Index measures the performance of growth stocks in developed countries throughout the world. The index includes reinvestment of dividends, net of foreign withholding taxes. The Dow Jones-UBS Commodity Index is composed of futures contracts on 19 physical commodities. The BofA Merrill Lynch High Yield Master II Index is an unmanaged index consisting of US dollar-denominated bonds that are issued in countries having a BBB3 or higher debt rating with at least one year remaining until maturity. All bonds must have a credit rating below investment grade but not in default. The FTSE NAREIT US Real Estate Index Series is designed to present investors with a comprehensive family of REIT performance indexes that span the commercial real estate space across the US economy, offering exposure to all investment and property sectors. The BofA Merrill Lynch US Broad Market Bond Index tracks the performance of US dollar-denominated investment-grade government and corporate public debt issued in the US domestic bond market, including US Treasury, quasi-government, corporate, securitized and collateralized securities. Unless otherwise noted, index returns reflect the reinvestment of income dividends and capital gains, if any, but do not reflect fees, brokerage commissions or other expenses of investing. It is not possible to invest directly in an index.

WP-09-0513 | AGI-2013-04-23-6734